The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. XXVIII. March 25, 1933 No. 717

Notes and Comments

Chemical Warfare

AT Geneva, in the Chancellories of Europe, in Parliament and in the Press there is talk of war. Except in the more sensational Press the talk is not of the making of war but of the prevention of war. Whether the two types of discussion are really as far apart as they would seem logically to be is not a matter about which we are called upon to express an opinion. If there were not fear of war there would not be so much discussion on disarmament. As our columns have shown, considerable interest is taken in the subject of chemical warfare. Proposals are made to abolish that and other of the more recent means invented by man for the destruction of his fellows; suggestions are made that professional chemists shall be prevented by some form of professional ethics from assisting in the manufacture of the more frightful forms of munitions; penalties are proposed against any chemist who transgresses this rule.

It is well that internationally-minded groups of scientific men should consider well the fundamentals underlying their proposals before putting them forward publicly. Few things are more harmful alike to a reputation and to a cause than ill-considered publicity. Can action by one body of men, however distinguished, prevent the use of a weapon in war? The answer to this question cannot be properly considered in a calm atmosphere; only by realising the atmosphere under which the war-cloud gathers can a psychologically true answer be given. It is idle to pretend that war is impossible. During the past fortnight there has been noticeable a distinct uneasiness regarding the imminence of a European war. The very fact of the ease with which public apprehension has been aroused shows that human nature has not changed and that, given a cause, mankind will still fight. The next war may or may not be fought in our lifetime; we who have known not only war but also the nature of the peace that follows war, pray fervently that it may not.

The Chemists' Best Contribution

WHEN a nation is attacked it must defend itself or perish, and it is in this light that the proposals to limit or abolish chemical warfare must be judged. There is no method of preventing research into chemical methods of warfare, and it would be the height of unwisdom to neglect that elementary precaution against surprise. Plans for chemical warfare would be worked out before the outbreak of war. The training of the juniors necessary to control the manufacturing processes would be the simplest part of the matter, more especially as in a body of men numbering thousands it would be impossible to obtain unanimity of action; many, either for gain, from a sense of patriotism, or under compulsion, would take the line of least resistance. Our conclusion, then, differs from that of some of our correspondents in this respect that whilst we are wholeheartedly in favour of the total abolition of war (if that were possible), and we would welcome any proposal that would really limit warlike activities in such a manner as to cause the minimum of suffering to non-combatants and belligerents alike, we do not consider that united action by chemists as a body would be in the least likely to achieve that desirable object.

Defence and attack are national questions and must be regarded nationally and not by one section of the community—and one that is numerically small at that. Should we be deemed callous if we suggested that the weapons used in warfare are largely a matter of use? We do not doubt that there was a decided agitation in the middle ages against the use of gun-powder when first it was invented. To us the best contribution that chemists can make towards the reduction of the frightfulness of modern warfare is to devote their energies to finding means for rendering the gases, bacteria and other poisonous weapons innocuous. Let science devote itself to preventing these new forms of offence from being effective.

Interchange of Information

WE commend to the chemical industry in general the experiment of the Nottingham Section of the Society of Chemical Industry in inviting several of its members to present at a single meeting a series of short papers dealing with problems they had encountered in industry. In the Press almost simultaneously there was an account of a legal prosecution for the disclosure of chemical secrets. Loyalty to one's firm is, of course, the basis of employment, but we hold that the desire for secrecy is carried to altogether unnecessary lengths in the chemical industry. In the gas industry, for example, everyone who has made an improvement in plant or process is anxious to share it with others with the result that technical progress has been rapid. There are few industries so efficient as the gas industry. It may be objected that the gas industry is not composed of mutually competitive firms. Its sister, the coke oven industry, is competitive just as is the chemical industry. Less than 20 years ago a hush-hush policy prevailed here also; mutual acquaintanceships between managers of neighbouring plants were actively discouraged. All that is now swept away with the same result of rapid technical progress. The chemical industry would gain

more than it would lose by a more open policy. Secrecy has been the rule from the earliest times, but the advantages that would follow collaboration are so manifest from the experiences of others that we have no hesitation in recommending it.

The chemical trade like other trades, must in the future organise itself on a national basis to provide a means of competition with other nations, rather than indulge in internecine struggles one firm with another. The first stage of this new order of things must be the freer interchange of information and secrets. Often it is found that the jealously guarded secrets of a firm are nothing but the out-of-date practice of a past generation. An open policy would do much to improve our chemical practice. Sir Alexander Gibb, whom we have previously quoted, was able to state that "in some of the more important electro-chemical industries, processes are almost exactly the same as they were 30 years ago, and entail an uneconomic use of electricity." The research associations are doing much to collect and correlate information, but there yet remains much that can be done by collaboration between the staffs of the several companies in regard to the daily work of running the plant and the dissemination of ideas.

Imperial Chemical Recovery

SIR HARRY MCGOWAN'S optimism in his address to the shareholders of Imperial Chemical Industries, Ltd., at the annual meeting of the company nearly a year ago has been proved by the events of the intervening twelve months to have been well founded. On that occasion Sir Harry observed that: "Unless some collapse not at present with common contemplation should descend upon the world, the results of our trading for the current year should be at least as good as they were last year. Indeed, if we may take the first three months of 1932 as an index, there is every probability that they will be better, but the measure of increase, if it should accrue, must be left to events to determine." The preliminary announcement of the financial result of last year's working, issued last week, revealed a gross income of £6,415,423, a sum not far short of the record of £6,502,341 earned in 1929, when the company's miscellaneous investments in America and elsewhere were yielding much more than they are now.

After repeating last year's allocation of £1,000,000 to the central obsolescence fund and providing £686,000 (against £260,000) for income-tax, the company shows a net profit of £4,729,000, which is £1,321,000 larger than a year ago. The board is raising the dividend for the year on the ordinary shares from 4½ to 6 per cent., the addition requiring £654,000, and is placing £500,000 to general reserve. The balance to be carried forward is £27,000 larger at £544,000. Since 7 per cent. has to be paid on the ordinary before the deferred shares rank, there is no question of anything for the deferred shares. The earnings on the ordinary, however, work out at 7.6 per cent., so that there actually was something available for the deferred if the directors had decided to distribute up to the limit. The most interesting figure in the preliminary announcement is the £686,351 reserved for income-tax. This is much larger than in any previous year, and if it represents the amount for which the company will actually be liable, at current rates, on the 1932 profits, it suggests that the directors must have taken a more conservative view of profits than the Inland Revenue is expected to. The figures as they stand leave surplus earnings of only £526,945 after paying dividends. The amount reserved for tax this year would imply that rather more than the whole of the £1,000,000 put to central obsolescence should be added to the surplus profits after providing for such depreciation as is allowed for tax purposes.

Restoration of Wage Cuts

WIDESPREAD satisfaction has been afforded by the announcement, simultaneously with the issue of the preliminary financial statement last week of the restoration of the whole of the Imperial Chemical Industries wage cuts as from April 3. The number of workpeople to receive the increase of wages is 25,000 and the amount of the increase is 2s. 6d. a week for about half of them and 3s. or 3s. 6d. for the other half. The total increase will amount to £180,000 a year. It must be understood that the increase applies to the workpeople of I.C.I. only and is not general in the chemical industry. I.C.I. represents 27 of the 75 firms included in the Chemical and Allied Employers' Federation and two-thirds of the workpeople in the industry are in I.C.I. employment. The action of the I.C.I. management, which was wholly spontaneous and came as a surprise to the workpeople, is an example of sharing prosperity.

In addition to the notice of the restoration of the wage cuts, which we quoted last week, Sir Harry McGowan addressed a covering letter to the works councils, which is equally worth quoting. He wrote: "While we can in no way afford to prophesy the future, my colleagues and I fell we are justified in restoring to the workers the amount of the wage reduction which was authorised by the Joint Industrial Council in June 1931. We are taking this step in recognition of the attitude adopted by the workers in 1931 and of the helpful co-operation we have received generally from them. I would remind you, however, that the improvement in conditions may not be maintained. The world situation is a very long way from being satisfactory and although we have, at the moment, no reason to expect it, there must always be the possibility that our own company's position may require again to be safeguarded as it did in 1931. We feel, however, that our workers have that degree of confidence in us which would enable us to take whatever action might be necessary to protect the prosperity of the great undertaking in which we all have so personal an interest."

Royalty and Plastics

THE British Plastic Moulding Trade Association was honoured by having Prince George as the guest of honour at its annual trade luncheon at the Savoy Hotel on Thursday. Few trade associations can point to recognition by royalty so early in their career, for the association is only just three years old. But its rapid growth is characteristic of the industry, which is as remarkable and varied as it is difficult to define. Plastics is perhaps the only trade known by a name which indicates one stage in the manufacture of its products. The industry comprises three distinct parts —the maker of the chemicals, the maker of the raw materials from the chemical bases and the section of the trade which processes the mouldable plastic materials into objects of every-day use.

The Chemistry of Hydrocarbon Combustion

Professor W. A. Bone's Lecture to the Royal Society of Arts

In his lecture to the Royal Society of Arts, on March 15, Professor W. A. Bone reviewed the outstanding facts of hydrocarbon combustion and showed how they may be accounted for. Introducing his subject, he said that forty years ago chemistry was predominantly an experimental science in the sense that the careful ascertainment of facts and their co-ordination preceded any theories concerning them, but in recent years the bias in chemistry seems to have shifted over to speculations and cryptic nomenclatures, with the result that theories are appearing in scientific literature without sufficient and critical examination, or consideration of how far they are capable of explaining well-established facts.

From 1898 to 1912, in conjunction with various collaborators at both Manchester and Leeds Universities, he carried out a systematic investigation embracing both slow and explosive combustion right up to detonation, the results of which established the "hydroxylation theory" as a working hypothesis. Hitherto, save in one or two isolated instances, all the evidence had reference to explosive combustion, and practically nothing was known about the slow combustion of hydrocarbons; yet it was obvious that if unstable oxygenated molecules of any kind are initially formed, the chances of detecting and isolating them would be far greater in slow combustion than at the high temperature and rapid changes in flames. It was therefore decided to concentrate, first of all, upon the slow combustion of methane, ethane, ethylene and acetylene, which, being the simplest cases, were most likely to yield results amenable to definite interpretation.

Quiet Flameless Combustion

Here it was found that all the four hydrocarbons examined undergo quiet flameless combustion producing oxides of carbon, steam, aldehydes and acids, without any appearance whatever of carbon or hydrogen, in circumstances precluding any appreciable oxidation of either hydrogen or carbonic oxide; that methane is less readily so oxidised than the other three; that while equimolecular hydrocarbon-oxygen mixtures were seemingly the most reactive, and the 2 : 1 mixture (*i.e.*, $2C_2H_6 + O_2$) was very nearly so, an excess of oxygen beyond the equimolecular proportion always greatly retarded the reaction; and that in all cases aldehydic formation is prominent at an early stage in the oxidation, definite evidence being obtained in the case of ethylene of its preceding any formation of either steam or oxides of carbon, while with acetylene there was indication of the initial transient formation of an oxygenated molecule $C_2H_2O_2$ which immediately gave rise to carbonic oxide and formaldehyde before any steam appeared. Another outstanding feature of all the oxidations was the persistent formation of carbon dioxide in circumstances which, while precluding its arising by the secondary oxidation of the monoxide, favoured its doing so by the oxidation of formic acid which was always present among the products.

In these investigations the intermediate formation of intermediate aldehydes and acids was proved. In the case of methane there was formaldehyde and formic acid; from ethane, acet- and form-aldehydes and formic acid; from ethylene, also acet- and form-aldehydes and formic acid; and from acetylene, $C_2H_2O_2$ and its polymeride polyglycolide $(C_2H_2O_2)x$, formaldehyde and formic acid. These features pointed unmistakably to an initial association of the hydrocarbon and oxygen producing in each case an oxygenated molecule which subsequently either decomposed or was further oxidised, according to circumstances.

Nature of the Initial Oxygenated Molecule

Continuing the investigation it was of prime importance to establish the nature of the initial oxygenated molecule, and here, at first, matters were not so clear as they are now. While the known facts accorded well with the hydroxylation theory, it is only recently that direct proof of the initial formation of either methyl alcohol in the case of methane, or of ethyl alcohol in that of ethane, has been forthcoming. When it was found that (i) under experimental conditions the alcohols in question are oxidised much faster than the corresponding hydrocarbons, and (ii) on oxidation with ozone at 100° ethane yields successively ethyl alcohol, acetaldehyde and acetic acid, the absence of more direct evidence was not felt to be a serious obstacle to the adoption of the theory. The outstanding fact that in all four cases under examination the hydrocarbon was oxidised to oxides of carbon, steam and aldehydes without any liberation of either carbon or hydrogen seemed difficult to explain, however, except on the supposition of such products having arisen by the thermal decomposition of intermediate hydroxylated molecules.

In extending the inquiry to explosive combustion it soon became evident that the main course of the chemical changes concerned therein may be satisfactorily interpreted on the supposition that the result of the initial encounters between hydrocarbon and oxygen is the same in both, namely, the formation of an "oxygenated" (and usually a "hydroxylated") molecule. Undoubtedly at the higher temperatures of flames, secondary thermal decompositions come into play at an earlier stage, and play a more conspicuous rôle, than in slow combustion, but there are the strongest reasons for believing that they do not precede the onslaught of the oxygen upon the hydrocarbon, but arise in consequence thereof.

Intermediate Formation of Aldehydes

At fairly low temperatures the vapours of primary alcohols decompose primarily into steam and an unsaturated hydrocarbon molecule or residue, but at higher temperatures into hydrogen and the corresponding aldehydes. In intermediate ranges both changes may occur simultaneously, and in flames they are always followed by secondary decompositions and/or hydrogenation, according to circumstances. At temperatures between about 400° and 600° (or thereabouts) aldehyde vapours, containing one $-CHO$ group and one or more other carbon atoms, are primarily resolved into CO and a saturated hydrocarbon, as in the case of acetaldehyde:—

$$CH_3.CHO = CH_4 + CO + (2\ \text{K.C.U.'s})$$

and with further rising temperature, the breakdown becomes progressively more complete, tending at very high temperatures to some such final stage as:—

$$CH_3.CHO = C + 2H_2 + CO - (19.8\ \text{K.C.U.'s})$$

Of all the oxygenated molecules known to be formed in slow combustion, the vapour of formaldehyde is pre-eminently that which at all temperatures in flames decomposes primarily into carbonic oxide and hydrogen (plus, maybe, some trace of methane) without any separation of carbon whatever:—

$$H.CHO = H_2 + CO - (13.5\ \text{K.C.U.'s}).$$

Glyoxal vapour would be resolved at all temperatures primarily into CO + H.CHO and secondarily into $2CO + H_2$, also without any carbon deposition. Consequently, whenever the explosion of a hydrocarbon-oxygen medium results in substantially nothing but carbonic oxide and hydrogen, without any carbon deposition, an intermediate formation of formaldehyde, or possibly glyoxal (or both) may reasonably be inferred.

Hydroxylation v. Peroxidation

On explosion with its own volume of oxygen—or just half of that required for complete combustion—methane yields principally carbonic oxide, hydrogen and steam:—

$$CH_4 + O_2 = CO + H_2 + H_2O$$

although a relatively small amount of carbon dioxide is produced owing to the "water-gas reaction" $CO + OH_2 = CO_2 + H_2$ coming into play during the cooling period. Such result is just what might be predicted from the "hydroxylation" theory, supposing a "non-stop" run through the mon-hydroxy to the di-hydroxy-stage followed immediately by a complete breakdown of formaldehyde into carbonic oxide and hydrogen and subsequent "water-gas reaction" during the cooling.

The explosion of an equimolecular mixture of ethane and oxygen was immediately seen to be crucial as between the former idea of a preferential burning of the carbon and the "hydroxylation" theory. For, whereas, according to the former, only carbonic oxide and hydrogen should result, the "hydroxylation" theory would require the formation of methane, carbon, hydrogen, carbonic oxide and steam, with some carbon deposition.

In recent years there has been much talk about the initial association of the hydrocarbon and oxygen resulting in a "peroxide" rather than an "hydroxylated" molecule, alkyl peroxides (*e.g.*, $CH_3.OOH$ and $CH_3.O.O.CH_3$), which were first described in 1900-1 by Baeyer and Villiger and have recently been re-investigated by Rieche and his collaborators, are obtained by acting upon a di-alkyl-sulphate with hydrogen peroxide in alkaline solution. They are unstable endothermic liquids which readily explode upon being suddenly heated or subjected to shock, producing aldehydes and hydrogen together with hydrocarbons, alcohols, acids and steam.

It was the late Professor Callender who, as the result of experiments upon the slow combustion of hexane, which resulted in the formation of valeraldehyde, acetaldehyde and formaldehyde without any detectable initial hexyl alcohol $C_6H_{13}OH$, first suggested that the intense oxidation of a hydrocarbon in air more probably involves the formation of an alkyl peroxide "by the direct incorporation of the oxygen molecule in the hydrocarbon molecule and after collision" which subsequently decomposes into aldehydes and water. Although at first sight such a notion may seem plausible enough, Professor Bone thinks that the evidence adduced in its favour is quite inadequate. He and his colleagues recently sought diligently but wholly in vain for such evidence in the slow combustion of methane, ethane and propane, although they found some evidence of secondary "peroxidation" of aldehydes, and are of opinion that the "peroxidation" hypothesis probably arose out of a mistaking of such secondary effects for a primary peroxidation of the hydrocarbon, of which they could find no evidence whatsoever.

Concluding his lecture, Professor Bone said that there are several positive lines of evidence which converge against the "peroxidation" but are in favour of the "hydroxylation" theory of hydrocarbon combustion. First of all, there is the significant fact that in the slow combustion of gaseous hydrocarbons at atmospheric pressure the most reactive instances are not the equimolecular but those with a hydrocarbon oxygen ratio 2 : 1 corresponding with the alcohol-forming ratio. Secondly, careful experiments have shown that whereas during the "induction periods" of such reactions the formation of minute quantities of aldehydes can usually be observed, no trace of any either precedent or simultaneous peroxide-formation can be detected. Thirdly, in experiments on the pressure-oxidation of methane, carried out by Drs. D. M. Newitt and E. A. Haffner, substantial quantities of both methyl alcohol and formaldehyde were isolated without any sign of peroxide formation being detected at any stage of the process. Finally, experiments upon the pressure oxidation of ethane recently completed, and now in course of publication, by Dr. D. M. Newitt and Mr. A. M. Bloch have resulted in the isolation of large quantities of ethyl and methyl alcohols besides acet- and form-aldehyde, acetic and formic acids.

The experimental evidence which Professor Bone laid before his audience comprised the slow and explosive combustion of all the known gaseous hydrocarbons (*i.e.*, methane, ethane, propane, and butanes; ethylene, propylene and butylenes; trimethylene; and acetylene), as studied during the past forty years in his laboratories under a wide range of conditions right up to detonation and high pressure explosions. Practically every postulated intermediate compound in the hydroxylation scheme has not only been isolated but in many cases quantitatively determined. In his opinion, its cumulative force is overwhelmingly in favour of hydroxylation as against the peroxidation theory. "Indeed," he said, "throughout these experiments, not a scrap of evidence in favour of the latter has been forthcoming."

Letters to the Editor

The Editor welcomes expression of opinion and fact from responsible persons for publication in these columns. Signed letters are, of course, preferred, but where a desire for anonymity is indicated this will invariably be respected. From time to time letters containing useful ideas and suggestions have been received, signed with a nom-de-plume and giving no information as to their origin. Correspondence cannot be published in THE CHEMICAL AGE unless its authorship is revealed to the Editor.

A New Research Handbook

SIR,—We are engaged in compiling a "Handbook of Extra-University Research in Pure and Applied Science," in which we propose to give data concerning commercial, endowed, and private research laboratories not included in the Universities' Year Book. We do not wish to include laboratories and other institutions devoted solely to testing materials and products, collecting data and other work not of a developmental and original character. Firms and others who are engaged in research are invited to communicate with us.

We propose to state the type or types of research in progress (such as fundamental, new inventions, improvement in production methods, improvement in product), staff with qualifications, and recent publications, including patents. We should also like data of approximate floor space and annual expenditure. We hope that the publication will be of service to those with ideas, materials, instruments and services to market, and also to those anxious to be informed of these. We also believe that it will serve as an advertisement of, and a further spur to, the enthusiasm for progress in Britain.—Yours faithfully,

B. W. HOLMAN.
Hon. Gen. Secretary.

The Association of Scientific Workers,
70 Victoria Street, S.W.1.

Suggested Budget Reform

SIR,—By a provision, in his forthcoming Budget, that for the next three years expenditure on plant, premises and accessories for the improvement of business should be chargeable against profits for income tax as to one-third of their original cost instead of 5 per cent. on reducing values, as at present, the Chancellor of the Exchequer would be giving a splendid stimulus to industry and employment, while involving the Treasury in no net loss of revenue. In fact, their figures would show a gain. This sounds a startling proposal, but let us reduce it to figures:—Of each £1 so spent, one-third—6s. 8d.—would be chargeable against the profits of the year, reducing income tax by 1s. 8d. But every £1 spent in equipment would mean at least 10s. spent in wages; in many cases, more. Every 10s. spent in wages would obviate the necessity of spending 3s. 4d. in dole payments (assuming the average wage earned is three times the dole). Therefore a net gain of 1s.8d. in the £ would result.

If a firm making £100,000 profits and paying income tax of £25,000 were encouraged to spend £30,000 on new equipment, it would pay £2,500 less in taxation to the Treasury (*i.e.*, 5s. in the £ on £10,000) but would create £15,000 in wages and thus obviate the spending by the Treasury of £5,000 in dole, a net gain of £2,500. In such times as the present, a measure of taxation relief calculated to create employment in this manner would seem sound finance and wise statemanship.—Yours faithfully,

ARTHUR H. GLEDHILL.
Chairman, Yorkshire Area Institution of Mechanical Engineers.

Trinity Works, Halifax.

World Benzol Production Decreases

PRODUCTION of benzol during the third quarter of 1932 showed a new decrease in all producing countries (with one exception), this being particularly marked in France—amounting to 13 per cent., according to the recent report of the International Benzol Committee. Stocks of benzol are also said to be decreasing. Purchases of benzol from abroad by the various importing countries in Europe are reported to be decreasing, both France and Germany showing a decline in imports of benzol. Exports remain stationary for all European countries. The report includes tables giving production of benzol in European countries during the third quarter of 1932.

The Maintenance of Crushing and Screening Machinery

By F. W. R. WILLIAMS, M.Inst.M.M.

MANUFACTURERS of crushing, pulverising and screening machinery are numerous. There are concerns who have specialised in this direction, whose names are synonymous with machinery of the first order, but there are others who have come into it who cannot have had the experience to insure that money will not be wasted, all in due course. What then are the points to be observed so that those, who have the responsibility of the maintenance of such machines, may be on the look out to see that money is not wasted in upkeep, in losses by unnecessary wear and tear, and by unhealthy conditions for workmen?

The conditions which are to be met with should be well understood. Then see that all parts of plant are accessible. This does not mean that the parts of the plants should be necessarily exposed, but rather that they should be readily "get-at-able" so that if any congestion occurs it can be rectified and if the plant is a well balanced one the difficulty can be readily overcome. The "open door" feature such as is found in most of the Sturtevant machines is desirable and saves time and temper.

Size Reducing Capacity

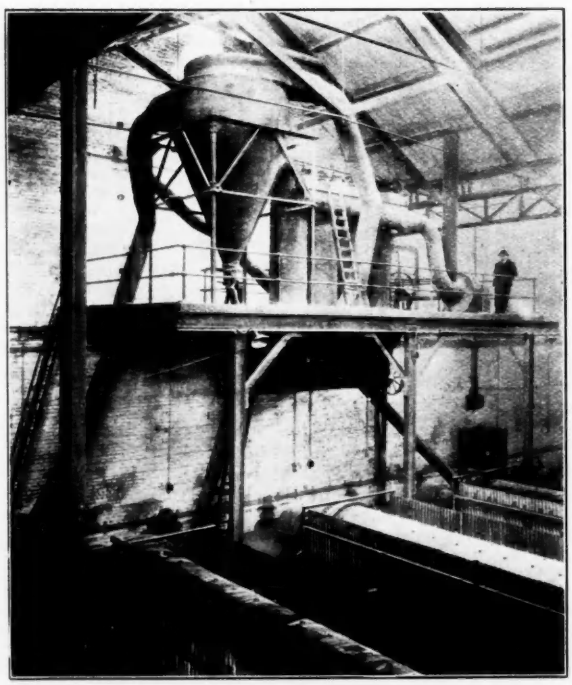
Another important features in any crushing and screening plant is that it should be practically dustless. This is one of the most important conditions which should be insisted upon; the Government regulations which are now imposed, designed for the benefit of the workmen, apply also for the benefit of the employer in that a clean plant makes for more healthy surroundings, promotes interest and increases efficiency. To this end, apart from the fact that all dust-producing machines should be under suction, vacuum cleaners are important adjuncts and quickly pay for themselves; in addition to being ideal cleaners of dust they also have ventilating effects. The question of lubrication is also very important, for different types of machines require different grades of oil and of grease. There are so many types of bearings used that it is advisable for users to ascertain from the makers what particular grade is recommended.

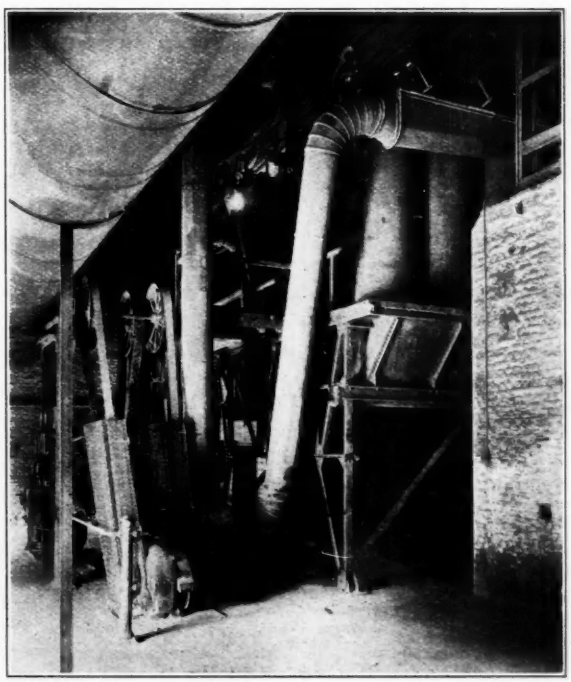
To return to the broad question of maintenance, it would be as well to take a general view of the machines used in this branch of industry and the why and wherefore such a machine is used so that expenses are not frittered away in attempting the impossible. The most usual error is to expect a machine to work far beyond its limits, that is to say to attempt to reduce in a single machine pieces of material from the size of a head to impalpable powder. This, of course, is an impossibility and if it were possible a mechanism having such a range would be most expensive and one which would certainly give trouble. Another very usual error is to look for a machine which will handle large lumps and reduce to small pieces in one operation with a capacity of a few tons hourly. The capacity and power, it must be remembered, are measured by the feed and discharge openings and the strength must be in proportion to the size, hardness and weight of material being handled. The most important consideration in the reduction field is to distinguish the character of material to be crushed.

These remarks are made to show that if a plant is not adapted for the economical production of the material which has to be dealt with, it is impossible to treat the question of maintenance seriously. Fortunately, to-day it is impossible to obtain machinery admirably designed and constructed, where the surrounding conditions are the same, but nevertheless one still finds crushing, pulverising and screening machinery which have been obtained from constructors with limited experience and the result is apparent to everyone.

Need for Dustless Working Conditions

Taking the case of elevators for example, how seldom it is that you find one doing its work noiselessly and without dust pouring out from every joint? Such a state of things is not necessary. Again with regard to screens, how often do you see them working unless it is in a cloud of dust? The writer was recently visiting a quarry which was situated in a rural district, where the whole countryside was covered with a white pall of dust. The cause of this could be ascertained





Typical Dust Exhausting Plant as designed by the Sturtevant Engineering Co., Ltd

without leaving the highway; it was due to a quarry plant situated about a hundred yards from the road. The noise of the crushers could be heard as they crushed the rocks; the crushed stone fell into an elevator—open to all the winds that blew—which discharged into some trommels and some screens about fifty feet above ground level. These screens were totally unprotected from the wind and the clouds of dust which were created, was the cause of the complaints of the villagers in the hamlet half-a-mile away. When one mentions the word maintenance under such conditions it seems almost a mockery. The common sense of it is to see that these crushing plants are constructed by men with experience and that the badly constructed ones are scrapped.

It is a fact that when a plant is properly designed and constructed the working conditions will be right and the workmen contented and it is probable that profits are being made for the shareholders. The machines will then be found to be supplied with clean oil and grease instead of with a mixture largely consisting of dust and grit and the question of maintenance is not one that is choked down our throat because the lack of it is so apparent. The business of crushing and pulverising machinery is to make dust and therefore it is most essential that when it is made that it can be controlled.

To sum up this question it resolves itself into one of purchasing such machines from makers with recognised experience and following their instructions. Then, in this field of endeavour, more employees will be working under better conditions than they are at present, and silicosis and kindred ailments will disappear.

German Chemical Export Trade

The Present Situation Reviewed

In common with other trades, the German chemical industry has not been spared the effects of the world depression, and the losses in trade it has suffered, both at home and abroad, are quite considerable. The export of chemical and pharmaceutical products constitutes one of the principal items in the German foreign trade, and in 1931 it amounted to 974 million marks, or about one-tenth of the total German exports. The proportion was increased in 1932 to one-eighth, but the goods sold last year were worth only 692 million marks, which means a drop of about 30 per cent. Practically every item on the list has suffered a set-back, in some cases as much as 50 per cent. Basic chemicals, acids, salts, and other compounds of basic chemicals fell from 426 million marks in 1931 to 306 millions last year. Paints and colours were exported for 193 million marks against 259 million in 1931. Potassium sulphate dropped from 51 million marks in 1931 to 27 millions. The export of barium, lead, sodium, and nickel compounds fell from 42,000 tons to 38,000 tons, and in connection with this item it is interesting to note that the value of the goods exported remained the same, namely about 52 million marks for each year. Certain products, however, have not suffered such a heavy drop as it is supposed, for instance, the quantity of potassium sulphate exported in 1932 was about 223,000 tons against 355,000 in 1931, and the price realised was 24 million marks less which corresponds to a reduction in price of about 14 per cent. only. The same circumstances apply to soda, pure and bleaching, and other cleansing materials. The Germans even succeeded in increasing their export of these from 61,000 tons in 1931 to 95,000 tons last year, the value of the goods being about 8 and 10 million marks respectively, representing a drop in price of about 20 per cent. Another considerable increase in exports took place in potassium nitrate (Chile saltpetre), of which Germany exported a total value of 21 million marks against 8 million marks in 1931.

Future Outlook

Considered generally the chemical markets remain much the same, England heading the list with 28 million marks, Holland with 26 million, and Switzerland with 21 million (all these figures are for the first nine months of last year only, totals for the year not being available yet). The heaviest losses the Germans have suffered in their business with the United States which bought for 19 million marks only against 43 million for the same period in 1931. The position of trade experienced a slight improvement during the last few months of 1932 both inland and for export, but since then no appreciable change has taken place in the situation. All in all, considering the very great handicaps under which the German industry has been working during the last two years, the results of their export business can be viewed by them in the nature of quite a good achievement. It is surprising indeed that, although the Germans claim that owing to the drop in sterling they have lost 60 per cent. of their trade in the Far East, the lower value of the pound has not affected the export of German chemical products to any appreciable extent.

Further outlook for the German foreign business is not very encouraging. During the latter half of the past year Germany embarked upon a butter and vegetables war with the Scandinavian countries and Holland, and after a long battle, quotas were introduced on the importation of butter into the country with the result that it has antagonised those countries to a very high degree indeed. Lately Germany has introduced restrictions on the importation of lard and paper wood, which measure has affected some other countries, namely Czechoslovakia, Poland, United States, and Russia. Apart from that, several commercial treaties have lately expired, and some have been renounced. Among these there is Sweden, Holland, Chile, and the Argentine. The effect of this will be an automatic increase of duties on the imports from those countries into Germany. Now, it was not to be expected that all these countries would look with equanimity upon the damage to their trade as a result of this policy, and some of them have not been long in devising retaliatory measures. But official steps apart, the feeling in those countries against German imports seems to have grown very strong, and the German papers are full of reports giving details of the injury that is being done to the German export trade by the Government policy. The chemical industry, that counts among the countries concerned some of its best customers, views with great concern the further development of this mutually destructive trade war, realising that this is giving the competitors a very good chance to get a foothold in the markets where German trade dominated before.

Exchange Reactions

The greatest damage done to the exports of German chemicals are the foreign exchange restrictions. Here again, the German manufacturers have very good reason to put part of the blame at least on their own Government. Germany was the first to introduce the control of currency when the financial crisis broke out over the country in the middle of 1931. The panic was great, and it is quite possible that this measure did prevent the German mark from breaking away from its moorings. The German example was soon afterwards followed by nearly the whole of Europe and some countries outside, in several cases for no apparent reason at all, simply as a retaliatory step. Gradually the foreign exchange restrictions, from the original aim of saving the currencies from depreciation, have turned into a weapon of throttling imports, the imports from Germany including. Where the German Government is also to blame is that up to this very moment it has not even attempted in the least to modify the foreign exchange restrictions in spite of the fact that the reason for the adoption of this measure has long since passed. It is clear that as long as Germany persists in keeping these restrictions, other countries will do the same, causing great damage to the German export trade in general and to the export of chemical products in particular.

Phosphates on the Danube

It is said that phosphates have been found in the shingle on the banks of the Danube. The Austrian Government has taken over the deposits and is carrying out investigations, though it is understood that the amount is small.

Personnel in Industry

Mr. W. A. S. Calder recalls some War-time Experiences

MR. W. A. S. CALDER, past-president of the Institution of Chemical Engineers, and a director of Imperial Chemical Industries, Ltd., read a paper on "Personnel in Industry" at a joint meeting of the Birmingham and Midland Section and the Chemical Engineering Group of the Society of Chemical Industry at Birmingham on March 17.

Mr. CALDER first took the opportunity of paying tribute to the response that was made by chemists and engineers to the country's call during the war years. The whole staff connected with H.M. Factory, Oldbury, carried on under, at times, most difficult and trying circumstances, with a selfless devotion to duty. One of the problems was to insist on much needed rest being taken and, on several occasions, it was only possible to enforce this by the threat of their admittance to the works being actually prevented. The same devotion was by no means confined to the Midlands, and the members of the profession were second to none in the sacrifices they made.

Conscientious Objectors

There was at one time a distinct shortage of suitably trained chemists and engineers, due in part to the sacrifices of those who had joined the forces in the early days and the value of whose lives was not sufficiently realised at that time by the higher powers. It was during this shortage than an event came to his notice which had always been far beyond his understanding. They received communications to the effect that two exceedingly well-trained men were due to go to prison in a week or so as conscientious objectors unless they could obtain work of national importance. They were both undoubtedly sincere and they affirmed that their consciences would not allow them to "take life." When asked if they would be prepared to assist in the manufacture of high explosives and poison gas, and in the preparation of any other materials to cause annoyance to our then enemies, they both declared their willingness to do their utmost in such connection. Both were engaged and a warning was given to several "trusties" to keep an eye on them and to see that they did their fair share. There was never any cause to complain of their work, and they zealously assisted in every way; the satisfaction of all concerned was also apparently to their own consciences.

The term "personnel" was originally restricted to the manhood of the Army and Navy, in contradistinction to their equipment. There was such a close resemblance between organised industry and the armed forces that the extension of the original meaning required no excuse and was a normal sequence.

There was no need to group personnel into classes; his strong conviction was that the ratio of good, bad, and indifferent performers was about equal in all the so-called grades of society. There was at least no disposition on the part of workmen to take a less broad and generous view of any proposal to deal with troublous times than would be taken by high officials. The broad principle to be observed in a desire for co-operation was to realise the respective duties which men owed to their subordinates, colleagues, and superiors. There must be real discipline but it must not be irksome; the mean course had to be steered between red tape and Red Flag.

Relative Importance of Duties

The realisation of the value of discipline was none too apparent to us as a nation, in our earlier years. Possibly the success in some directions of nations where compulsory military training was in force could be traced to this cause. His own belief, however, was that British personnel in industry was unexcelled if not unequalled in any other country. Certain other nations possibly had the faculty of excelling in certain directions and the devotion of a lifetime to a comparatively narrow field of observation could not be regarded as a typically British characteristic.

There was a general rule which he had always laid down to chemists and engineers in charge of departments, and which had recently been returned to us by the United States as a new maxim! It was that the relative importance of their duties should be placed in the following order—(1) safeguarding the men under their control; (2) maintaining or improving the quality of the products turned out; and (3) improving efficiency and reducing costs. The last was so obvious that there was little or no risk of its being overlooked and that was partly why it yielded precedence to the question of quality. Most old-fashioned firms had created such relationships with their customers that the most complete confidence existed. That being so, it was conceivable that a gradual degradation of quality could go on for weeks and even months without its being observed and a complete shattering of the confidence which had taken years to gain might ensue.

Keeping Promises

All promises should be fully implemented. There was nothing more likely to undermine relationships than the lightly given promise by some great-hearted fellow which, through some reason or other, he failed to keep. The result was the same in all cases, whether the promise referred to improved position, improved remuneration, or improved conditions. A difficult question was the treatment of those who offended against rules or disobeyed orders. The eagle eye for any such features might not infrequently be replaced by the Nelson eye to the telescope. It was comparatively easy to create an atmosphere that nothing was really missed by those in charge but that occasionally misdeeds, especially if they had been caused by undue zeal, were not officially observed.

Mr. Calder recalled that on one occasion a special department in which the greatest interest was being taken in efficiency, was under the control of a deservedly popular chief who had imbued the whole of his command with the team spirit. Such extraordinarily good results were obtained that an investigation was held. It was found that although there was no question of any money bonus being involved, some of the loyal fellows, out of sheer goodwill, had been raiding a neighbouring department to secure material for improving their own efficiency figures.

A difficult and distasteful problem in connection with personnel in industry is that of dismissals. He had come across extraordinary and divergent views as to the type of men to select for retention. In one case the views of a certain school were faithfully reflected in the reply given by an extremely successful manufacturer to a friend who remarked that he did not think much of one of the manufacturer's staff. His reply was "I know that Mr. So-and-so is a fool, but that is the only type I care to employ." How different was the case of the brilliant and youthful administrator who (fortunately only theoretically) was always anxious to get rid of any member of his staff whom he did not think could ultimately occupy a high position. His own view was that under ordinary circumstances only the hopelessly lazy and dishonest should be discharged.

A Final Good-bye

In connection with any necessary partings it was far better that they should be made effective immediately after they had been decided upon. "Welcome the coming, speed the parting guest" had a real significance in such cases. The most generous financial arrangements should be made and a final "good-bye" said, as any man under notice tended to be, consciously or unconsciously, a clog if not a distinct menace to an organisation, and if free he had the whole of his time at his disposal for finding another sphere of activity.

The varying types were well shown up in the question of reports. They all knew the man who would furnish a report on any subject, promptly and quantitively, and they knew how they usually hated wading through such reports. At the other end of the pole was the man whose reports were a delight to read, concise, clear, and comprehensive, but with whom almost personal violence was necessary to obtain a report on anything!

While defining the scope of each man's particular duties, it was essential that the watertight compartment system should be discountenanced. There was still a point in the old story of the railway company where the one department successfully designed and constructed locomotives of magni-

ficent proportions, only to have it pointed out by another department that the existing bridges rendered it impossible for such engines to be run over the system.

A factor in promoting contentment was the question of the possibility of some financial return over and above the fixed salary or wages. It gave the greatest zest to all to feel that they participated in the prosperity of a concern. This could most wisely be arranged by some system of profit-sharing on a pooling basis of interests, but they must beware once more of the water-tight compartment system. It used to be argued that a profit-sharing system was all very well while there were profits to be shared but that the workmen, in particular, would resent it bitterly if any bonus they had enjoyed under ordinary conditions vanished in lean times. This argument was out of date and the average workman was capable of taking a sane and generous view of any such abnormal position; his reaction would only be to contribute his best to win through to prosperity.

The establishment of suggestion schemes was of real mutual benefit to workmen and employers when sympathetically administered. There was nothing which required more sympathy to ensure success. The average foreman did not take kindly to prize-winners. This feeling was entirely altered by the payment of a small proportionate bonus to each foreman for the prizes won by the men in his department. It might not sound a logical step to take, but it certainly succeeded in maintaining a flourishing crop of useful suggestions. The cultivation of a true sense of proportion in life generally, by all concerned, was the key-note to obtaining the best results in connection with personnel.

Mr. J. A. REAVELL, in moving a vote of thanks to Mr. Calder, said he had a firm conviction that the pace was set in a works by a few men at the top, and the attitude of mind of the workers was largely influenced by the sympathy and consideration that was shown to them by those few men. This principle applied equally to the scientific and research workers. He was of opinion that this country had produced and was going to produce as fine a lot of technical men as were to be found anywhere in the world. They were getting the right sort of men from the universities, and men who were serious and extremely keen about their jobs.

Those taking part in the discussion were the chairman, Mr. S. J. Tungay, Mr. G. B. Jones, Dr. A. J. V. Underwood, Mr. D. W. Parkes, Mr. J. McKillop, Mr. F. M. Potter, Mr. A. V. Rhead and Major L. J. Barley.

An informal dinner followed at the Imperial Hotel, Mr. Reavell presiding. Some interesting films taken at concerts and social events connected with the Society of Chemical Industry by Mr. George King (hon. secretary of the Birmingham and Midland Section) were shown.

Earlier in the day a party of about 40 members of the two groups visited the Bournville Works by invitation of Cadbury Bros. They were received by Mr. George Cadbury, a member of the firm, and made a tour of the works, particularly that portion relating to the engineering side. The party was entertained to tea, and on behalf of the firm Mr. George Cadbury gave them a cordial welcome. Due acknowledgment of the company's hospitality was made on behalf of the visitors by Mr. J. A. Reavell, chairman of the Chemical Engineering Group.

Average Error in Sampling

Its Industrial Significance Explained by Reference to Coal

THE general principles of sampling coal and coke were discussed by Mr. E. S. Grumell in a paper read before the West Cumberland Society of Chemists and Engineers, at Workington, on March 17. He said that it was very necessary to grasp the meaning of "average error," which could best be explained by a concrete example. If there are one hundred wagons of coal, and each wagon is sampled and tested for ash content, the nearest approach to the true ash content of the 1,000 tons will be the average of the ash contents of each wagon, which, for the sake of argument, we will assume to be 15 per cent. The ash content of the coal in individual wagons may vary from 10 per cent. up to 20 per cent. and will therefore deviate by a certain amount from the average or most probable value, but if we take all the deviations of individual wagons and add them up, irrespective of sign, and divide by 100, we shall obtain a mean deviation or "average error."

The term "average error," he continued, is a measure of the variability of a heterogeneous mixture: in this case, it is a measure of the irregularity of the product of mining coal. It may also be considered as representing the chance of getting more or less shale or other impurity in a given wagon containing a heterogeneous mixture of coal and impurity. In other words, it is a measure of the degree of variability of any substance or operation. In coal the variability is due to impurities such as shale; in coke the variability is due to water; in limestone, it is due to silica; an iron, due to carbon, sulphur or phosphorus; and so on, throughout the whole of the industries.

The Sampling of Small Coal

Data provided by the sampling of individual wagons of small coal (3 in. mesh) were available for a large number of coals varying in quality from washed coals of low ash content to rough slack of high ash content. As might have been expected it was found that the average error of coals with, say, 6 per cent. of ash was much lower than that of coals containing 15 per cent. It was also found that the ash content of individual wagons of coal averaging 6 per cent. of ash might be expected to vary between 3 per cent. and 9 per cent. whereas, when the ash content averaged 15 per cent., individual wagons would vary from 10 per cent. to 20 per cent. In other words, coals with a greater percentage of ash—which may be taken, as a general rule, to represent the presence of a greater percentage of adventitious impurity—have a greater degree of variability or a bigger average error. At first the average error was obtained by the sampling of a large number of individual wagons, and the full significance of average error was not known, but subsequent investigations have proved beyond doubt that the average error is a real characteristic of coal and can be applied irrespective of the quantity being considered.

In the early days it was suggested that the average error obtained by the sampling of, say, 100 individual wagons might bear some relationship to the number of wagons examined, so in several cases the 100 wagons were divided into lots of 20 wagons chosen at random, and it was found that the average error chosen each of the 20 wagon lots was of the same order as for the 100 wagons. It was then suggested that this measure of variability was one which pertained to wagons but did not necessarily represent the real variability of the coal and could not, for instance, apply to the distribution in a single wagon. This was investigated by taking and analysing separately a number of 2 lb. and 5 lb. increments, when it was again found that these had an average error of the same order, as is shown by the following figures:—

Average error as determined by wagons ...	2.41
Average error as determined by 2 lb. increment	2.33
Average error is determined by 5 lb. increment	2.12

Such investigations, the author pointed out, indicate that the "average error" is definitely a characteristic of the coal and a measure of the variability, and this has been amply confirmed by later work on the sampling of large coal.

German Zinc White Production

GERMAN official standards for zinc white prescribe a content of zinc oxide of at least 99 per cent. All impurities, including moisture, should not exceed 1 per cent. The content of lead oxide must not be higher than 0.4 per cent. The methods of manufacture likewise have been standardised and at present all German manufacturers operate the indirect, or French, method. The French method is employed by all German manufacturers associated in the VDZ, the German Association of Zinc White Producers founded in 1926. This association comprises the seven largest manufacturers.

Animal and Plant Fats

Chemical and Structural Problems Inviting Further Study

SOME curious features of the composition of fats in plants and in animals were outlined by Professor T. P. Hilditch in a lecture to the Manchester Section of the Institute of Chemistry, on March 16. The kinds and amounts of various fatty acids which are characteristic of several different groups of naturally-occurring fats were described in order to illustrate a few of the quantitative similarities or differences in fatty acid content which are found in natural fats, of which nearly 1,500 different kinds have now been recorded from plants and animals.

It was pointed out that nearly all fats are built up from a relatively small number of fatty acids, the structure of each of which is fairly simple and in most cases quite well known; and that, therefore, chemical study and classification of natural fats is chiefly a matter of (1) observing the relative proportions of the fatty acids specific to each fat; and (2) ascertaining how these acids are linked up with glycerol molecules to form mixtures of mixed triglycerides. Commencing with the growing plant, it appears that oleic, linoleic, palmitic and sometimes linolenic acid are the only members of the series which occur in any quantity as glycerides in the leaf, stem, and other parts.

In the reproductive system fats may be present in the exterior fruit-coat as well as in the seed (endosperm or embryo); in fruit-coat fats and in very many seed-fats the main component acids are still only those already mentioned, but many botanical families are characterised by the presence, in the seed-fats, of large amounts of other fatty acids which are frequently quite specific for a particular family. The kernal fats of the palm family, with high contents of lauric and myristic acids in the glycerides, were cited as a specially well-marked instance of this specificity, and also the relatively few cases (all belonging to a few tropical families) in which stearic acid is a prominent component of vegetable fats.

Variation in Composition

Regular, but minor variations in composition within the same group of fats are illustrated in the case of the fruit-coat fat of the native West African oil palm (red palm oil). Proceeding eastwards from Sierra Leone, palm oils from different districts show a progressive fall in palmitic acid content and corresponding rise in oleic acid, the oils from Liberia and the Ivory Coast being poorest in palmitic acid; but oils from the Gold Coast, Nigeria or the Congo again have a comparatively high content of palmitic acid and proportionately less oleic acid. The differences are probably due to different varieties of the oil palm rather than to climatic or other external factors, for plantation oils from the Congo, Malaya or Sumatra are all very closely alike in composition and very similar to, for example, a Lagos native oil.

Turning to land animal body-fats (including those of birds) it was emphasised that at least two different groups of these exist, so far as chemical composition is concerned. In one, which seems to include those of rodents (rat, rabbit) and birds (goose, hen), there is usually 20 to 25 per cent. of combined palmitic acid with oleic or linoleic acids in varying proportions, but with little (usually 5 per cent. or less) stearic acid; in the other group (which includes the important body-fats of pigs, sheep and oxen, and with which the corresponding milk-fats seem to have certain close general relationships in chemical constitution) the amount of palmitic acid is much the same, but stearic acid also becomes a major component and may exceed the amount of palmitic acid present.

Stearic and Oleic Acid

In lards and tallows moreover, there is a definite, if only approximate, balance between the amounts of stearic and oleic acid present in any given instance, the combined proportion of these acids (with linoleic) approaching a more or less constant figure (65 to 72 per cent.) in all tallows and lards so far examined. Moreover, the amount of completely-saturated glycerides (palmito-stearins) present in these fats is roughly proportional to the total proportion of saturated acids in the whole fat, and frequently reaches a fairly high figure (25 to 30 per cent.), whereas vegetable seed-fats which contain as much as 50 to 60 per cent. of stearic (or stearic and palmitic) acids contain only negligible amounts of palmito-stearins. The pig, sheep and ox body-fats, in fact, appear to owe the characteristic structure to some kind of hydrogenation process wherein oleo-glycerides have been partially converted into stearo-glycerides. Incidentally, the prevalent idea that stearic is the most typical of the natural fatty acids is now seen to rest only upon the relative familiarity and abundance in Europe of such fats as tallow and lard.

The particular examples of fats dealt with in the lecture were chosen in order to illustrate some of the interesting chemical and structural problems which invite study in this large group of natural products, and to indicate some of the directions in which investigation is going on at present. Observation and correlation of the many different categories of vegetable and animal fats seems still to be the immediate need: from the accumulated results of work on this kind there may later emerge points of attack on the more fundamental question of how fatty acids and glycerides are elaborated in the living organism.

Moulded Goods from Latex

A New Vulcanisation Process

PREMATURE coagulation of latex concentrates in the presence of sulphur can be avoided by incorporating protective colloids, but the latter are a drawback in the manufacture of transparent goods by the dipping method since they not only hinder vulcanisation but cloud up the otherwise glass-clear rubber film. Before the introduction of latex concentrates, transparent moulded rubber goods were obtained by dipping the moulds of porcelain, glass, etc., in a benzol solution containing rubber in conjunction with sulphur and an accelerator-activator (such as zinc oxide). Into the film of rubber-sulphur-activator was then allowed to diffuse an accelerator in aqueous or benzol solution and the dried product was vulcanised in the hot chamber. Successful adaptation of latex concentrates to the production of clear dipped goods has now been effected with the aid of a concentrate free from protective colloids, an account of the method appearing in the "Chemiker-Zeitung," February 15, 1933 (pages 121-122).

Details of the Process

The method employed utilises latex concentrate obtained by centrifuging crude latex to 60 per cent. concentration and stabilising it by ½ per cent. ammonia in the complete absence of protective colloids. On dipping a glass mould in the concentrate a glass-clear film remains into which is allowed to diffuse a colloidal solution of sulphur in benzol containing an accelerator. According to the degree of vulcanisation aimed at, only six to twelve seconds contact with this diffusing solution are required. The swelling of the rubber film on contact with the benzol enables the sulphur-activator combination to be incorporated as thoroughly as if the whole mixture has been worked up on hot rolls but with the great benefit of avoiding the los of nerve of the rubber otherwise following on the kneading and solubilising operations. The use of zinc diethyl dithiocarbamate as accelerator does away with the necessity for an accelerator-activator such as zinc oxide.

Numerous advantages are obviously offered by this new process which does away with the working up of a special solution of rubber on hot rolls and does not call for the installation of a solvent-recovery plant. Economical working follows the single working operation in which sulphur, accelerator and activator are simultaneously diffused into the latex film. The final warm vulcanisation process is carried out as simply as cold vulcanisation with sulphur chloride, with the advantage of importing greater durability to the finished article. The principle of the diffusion method was first introduced by the Naugatuck Chemical Co., whose German Patent 448,763 describes the diffusion into a thin rubber film of sulphur, tretramethyl thiuram ammonium sulphide and zinc stearate in a single benzol solution.

The Use of Ebonite in Chemical Works

A Competitor to Acid-Resisting Steel

WHILST ebonite has been in use as a lining for chemical plant for some time, it is only comparatively recently that it has been developed to the extent of competing with acid-resisting steels. Although not able to bear comparison with regard to physical properties, specially prepared ebonites have demonstrated themselves capable of resisting acids in a manner unknown to metals. These ebonites, according to the "Rubber Age," tend to bend, warp, or otherwise go out of shape unless firmly held in position, and the usual practice is to employ a rigid backing of steel or iron with the preparation lined on the inside. Following the results obtained from wide research experiments, it was ascertained that suitably treated ebonite could resist the corrosive influences of almost any acids, at different concentrations, and comparatively high temperatures. For example, aqua regia, which is reckoned to be about the most energetic of the highly corrosive acids, can be used up to boiling point with a concentration of upwards of 20 per cent., and the ebonite shows no signs of disintegrating.

The Need for a Substitute

In certain circumstances concentrated aqua regia has also been successfully used, which for long was considered to be an impossibility on account of the organic nature of the preparation. This constituted the chief object of the experiments conducted, as the processes to be worked concerned the extraction of various precious metals by means of wet chemical methods. Whilst the working of this on the small scale was a simple matter, a different state of affairs occurred on the large scale, since large glass or earthenware vessels are liable to crack and result in losses of the precious contents.

A substitute had to be found for the vitreous material which would not readily break and cause severe losses, and various alloys were tried, the upshot of which was the introduction of numerous nickel-chromium metals, but almost without exception, aqua regia proved a too powerful reagent.

Linings of ebonite were tried in the laboratory, and later affixed to steel boilers and dissolvers, and the process tried out. In the first place it was found that some modification was necessary in the manner of applying the heat, since direct heating would cause the ebonite to soften unduly, and also give rise to small bubbles of air forming inside the mass.

Indirect Heating

In order to overcome this, almost all systems for heating were used indirectly. Dissolvers which were heated by gas-ring burners were reconstructed so that a space intervened and allowed only the hot air to touch the outer metal. By suitable additions of cold air, the rise in temperature could be very accurately controlled, and was so modified that no overheating was possible. The commoner dye-pot style of dissolver in which the heating is done by a steam heated chest, or annular space, is used for larger operations, and is lined on the inside with ebonite. In both instances continued boiling with solutions of aqua regia caused the ebonite a display a slightly frizzled appearance. The rich residues containing the precious metal were slowly emptied in finely pulverised form into the hot liquor which was agitated by a mechanical stirrer. The heating, stirring, and addition of residues was kept up for many hours, after which the solution was left heating overnight in order to intensify the action of the acid.

All the small tanks, vats, pipes, heating coils, and stirrers were lined with ebonite by moulding or otherwise shaping on the spot, which is easily done. Although resistance to the acid was maintained, this appeared to be partly assisted by a slight film of material adhering to the surface of the ebonite itself, which in some respects may have been attributable to the ease with which the acid-resistance was continued. What happened to bring matters to a head was the unexpected loss of small amount of gold from the treatment of the precious metal residues in the ebonite lined vessel. On examination it was ascertained that whilst the ebonite had not lost weight as a result of corrosion, a slight increase in weight was recorded due to the penetration of the liquid. That is, with continuous action the ebonite, for some unknown reason, showed permeability of a purely mechanical nature whereby a slight loss of metal was sustained due to the pores retaining it.

Reclaiming the Metal

In reclaiming metal taken up by ebonite the old linings were stripped out of the tanks, and placed in a wind furnace where the blast caused the volatile rubber and sulphur constituents to burn off and leave a small fused mass containing what metal had been absorbed by the ebonite. This was then returned to the dissolving tanks for treatment as before. Tanks for electrolytic processes were used in this connection, for which a harder form of ebonite is necessary as the deposits which form as a result of the electrolysis have to be scraped off the bottom, and give rise to numerous difficulties. The electrolytes employed consist of both nitric and hydrochloric acid solutions, and the action of the current causes nitric oxides, and chlorine respectively to be evolved. These, together with the dissolving influence of the current itself, exert a severe action on bottom and sides of the tanks. The ebonite linings, however, withstood the action almost as well as did the ordinary earthenware troughs, whilst not having the attendant risks of cracking and breaking which usually accompany the latter. As in the former case, when a certain fixed length of time had elapsed, the linings were deemed to contain a small proportion of precious metals and were removed and burned as before.

Since the ebonite linings were successfully employed in the foregoing work, various new applications were tried. These chiefly related to dissolving and treating metallic residues which were known to be too complex to permit of economical recovery by direct smelting methods. Amongst these might be mentioned complex tin residues, and concentrates containing bismuth, cadmium, cobalt, and other less common metals which are simply dissolved in the laboratory, but which gave rise to almost innumerable difficulties on the large scale, particularly when no suitable acid-resisting lining material was forthcoming. In some instances the ebonite lining is fitted tightly on to the metal backing of the tanks, and in this way offers least resistance when it is desired to remove the material for reclamation purposes. In other cases it is heated on the surface of the tanks, whilst special cements are also employed, but whilst these latter systems appear to be most efficient at first sight, the job of removing an old lining is no sinecure.

Special Temperature Conditions

When dissolving odd materials of an insoluble nature in mixed acids, it has been found expedient to use special temperature conditions, either with or without the assistance of vacuums. The use of steam was ignored, and special jacketed pans were used, heated on the outside directly by gas burners. Inside the jackets, solutions of different concentrations of calcium chloride, etc., and similar salts, were added so that the boiling point was raised well above that of boiling water. The ebonite again proved itself capable of withstanding the effects of hydrochloric, nitric, and aqua regia solutions, although it had to be admitted that continued action of the latter acid was too severe, and left the skin of the lining rather frizzled and out of shape.

Information appears to be somewhat scanty as regards the preparation of these ebonites, and the little that has been gleaned is that the vulcanising is done by using special metallic sulphides, and also admixtures of asbestos or similar materials. It might be added that the acid-resisting properties of several different ebonites was more or less discovered accidentally when using them as insulators for carrying electrodes into electrolysis baths. The ebonites were continually splashed with the highly corrosive hot acids but showed little or no signs of giving way, and this led to the development of still more highly resistant qualities, which were specially prepared for the purpose.

International Society of Leather Trades Chemists

Progress of Work of the Sub-Committees

A MEETING of the British Section of the International Society of Leather Trades Chemists was held at the Leather Industries Department, Leeds University, on March 11. Dr. A. Turnbull, the president, was in the chair.

After formal business, the chairman of the Tannin Analysis Sub-Committee recommended that the modified Riess method be adopted as the only official method of filtration from a date not later than January 1, 1934. This recommendation was carried *nem. con.* and will thus go forward to the Amsterdam conference in September.

Mr. G. F. ROBERTSHAW reported considerable progress in the work of the Sub-Committee on Oils and Fats, in the direction of effecting the European standardisation of methods.

Mr. HILL described two methods which were under consideration by his committee on the detection of phenylene diamines in leather. These both appeared satisfactory for *p*-phenylene diamine but further work was required before the could be described as satisfactory for *m*-phenylene diamine.

pH Value of Tannin Extracts

Dr. D. BURTON then reported on the work of the Sub-Committee on Determination of *pH* Value of Tannin Extracts. Satisfactory results had been obtained with sulphited extracts by the use of the glass electrode. Some of the continental workers in this field were evidently still attached to the quinhydrone electrode, and there would probably be some animated discussion at the forthcoming Amsterdam conference.

The estimation of fat and water-solubles in leather was the subject of a paper by Dr. A. Colin-Russ, who said that the equilibrium constant for leather undergoing extraction is useful in determining the distribution between fat dissolved by solvent, and fat still left in the leather. He showed that the constant varies with the volume of extracting liquid—with progressive increase of volume it also increases then reaches a maximum, and finally decreases.

Deterioration of Vegetable Tanned Leather

A laboratory method for stripping vegetable tanned leather was described by Mr. R. F. Innes, who showed that stripping leather by immersing it for 24 hours in a 70 per cent. solution of acetone enabled tannin to be recovered from it, enough for a qualitative examination of the tanning material, whereas an aqueous extract frequently removed very little tannin.

A second paper by Mr. Innes dealt with the cause and prevention of deterioration of vegetable tanned leather on storage. In this paper an entirely new light was thrown on the many inconsistent and contradictory facts connected with the problem which had baffled the leather and allied trades for generations, such as (1) the survival of leather prepared 100 years ago or more; (2) some books have remained sound while others uniformly bound and stored have rotted badly; (3) the survival of leathers tanned with catechol tannins and dyed in the presence of sulphuric acid; (4) leathers dyed with wood dyes last better than those dyed with aniline dyes. Numerous examples were shown where crust leathers withstood an artificial rotting test and dyed leathers failed under it; other examples of crust leather had been so treated that they failed under the test, whilst many dyed leathers were so treated that they resisted artificial rotting. The author also described the method he had adopted to demonstrate the parallelism of artificial rotting with natural rotting. It therefore appears likely that premature decay can be prevented, and that sooner or later confidence in leather for covering materials such as bags, chairs and books, etc., will be restored.

The Export of Chemicals from Sweden

Review of Some of the Principal Factories

THE abundance of hydro-electric power in Sweden has been of great benefit to many of the country's industries, amongst them the production of chemicals. It is not just by chance that a great many of the chemical factories in Sweden are situated close to water-power stations. The March issue of the "Anglo-Swedish Trade Journal" the official organ of the Swedish Chamber of Commerce for the United Kingdom, states that Swedish exports of chemicals can be divided into two groups—wood distillation and electro-chemical products. The forests supply wood for the production of charcoal with its different distillates: tar, tar oil, pitch, metanole, acetate of lime, acetic acid, crude turpentine, etc. Valuable by-products are yielded by the waste lye of the chemical pulp mills, such as pine oil, liquid rosin and sulphite spirits, a pure ethyl alcohol which is used extensively mixed with petrol as fuel for automobile and other internal combustion engines. All these products are manufactured by most of the Swedish timber and allied industries.

The second group, on the other hand, which is mainly composed of carbides, chlorates, hydroxides, sulphates, superphosphates and acids, is exported by concerns specialising in their manufacture. Chlorates are manufactured for explosives and matches, part of the output being exported. The output of calcium carbide exceeds 40,000 tons per annum, part of which is used in the manufacture of cyanamide and part for generating acetylene; about 13,000 tons are exported. Other manufactures include carborundum and a number of ferro-alloys, the annual production amounting to nearly 40,000 tons. In 1931 the value of the exports of the above-mentioned articles from Sweden amounted to more than £300,000.

Exports to Great Britain

Detailed statistics of these exports, as well as of exports to Great Britain, will be found in the next column.

Sweden's exports, particularly of hydroxides, mainly cater for chemical and analytical rather than industrial purposes. The Journal gives some particulars regarding the principal factories specialising in the manufacture of chemicals:—

	Total Export.		Export to Great Britain.	
	Quantity. Kg.	Value. £	Quantity. Kg.	Value. £
Alum and sulphate of alumina	10,458,555	42,600	2,259,165	9,380
Carbide of calcium and carbide of barium ..	8,800,910	108,665	4,180,950	49,660
Potassium hydroxide ..	528,898	29,050	91,700	4,600
Potassium chlorate ..	4,204,512	92,950	1,821,204	40,120
Silicon carbide	388,523	15,235	58,283	1,900
Sodium hydroxide ..	395,426	12,990	4,050	200
Sodium sulphate	1,453,147	2,560	289,580	420
Nickel sulphate	36,769	6,850	35,367	6,580

Stockholm's Superfosfat Fabriks Aktiebolag was founded in 1871. It has works close to the biggest hydro-electric stations in Sweden, for example, at Trollhattan and Porjus. The principal manufacturers are fertilisers, such as cyanide of calcium, sulphate of ammonia, etc., calcium carbide, chlorates and perchlorates, ammonia, ferro-alloys and superphosphates. Swedish calcium carbide enjoys a good reputation in Great Britain owing to its fine and even quality, high gasual output and careful packing.

Largest Hydro-Electric Station in Sweden

Alby Nya Kloratfabriksaktiebolag was founded in 1915 and has its head office at Mansbo, Avesta. The works are situated at Trollhattan, where is the biggest hydro-electric power station in Sweden. The company was at one time the second

of its kind in the world for the manufacture of chlorates and perchlorates. The value of output is at present more than £200,000 per annum.

Chlorate of potash is mainly used for the manufacture of matches. The sale of this article is, however, somewhat restricted at present owing to the unsettled conditions in the match trade.

Elektrokemiska Aktiebolaget is situated at Bohus, close by the river Göta, only ten miles from Gothenburg. The factory employs about 200 workmen. The firm has from the beginning specialised in the manufacture of chemically pure alkalies for etching, the purity and uniform quality of which have given the firm a good name in all parts of the world. The manufacture of other articles, such as chloride of iron, both for technical and other purposes, and chemically pure hydrochloric acid, has also been taken up. During recent years the factory has been relatively well employed, in spite of currency restrictions and other well-known difficulties. Nevertheless, the customs duties imposed in many countries, and especially in Great Britain, have inevitably affected the company's sales.

Höganäs Billesholms Aktiebolag is a large concern, the principal manufactures of which are firebricks and fireclay, glazed earthenware pipes, acid-proof bricks, tiles and iron sponge. The main product is silicon carbide.

Since 1918 the company has been operating a carbide plant, the electric power for which is obtained from the well-known Trollhattan Falls. The capacity of the plant is 2,000 tons of Sisto silicon carbide per annum. The company also manufactures about 150,000 tons per annum of high-grade clay products.

Aktiebolaget Oskarshamns Kopparverk was formed in 1915 with a capital of Kr. 1,000,000, and employs 150 hands. The value of output in 1931 was £120,000. The main products of the company are: Cemented copper, best selected copper, purple ore (sintered and unsintered), calcium, Glauber's salt, zinc oxide and cobalt. The company's O.K. copper brand is registered on the London Metal Exchange.

In recent years the company has produced zinc oxide, containing about 70 per cent. zinc. Extensive experiments have been made at the works, which have resulted in the company's adopting its own methods of production. The yearly output of zinc oxide is 2,000 tons, all of which is exported.

Skånska Attikfabriken Aktiebolag was established in 1882 and converted into a limited company in 1925. The works are situated at Perstorp, 30 miles from Hälsingborg, their port of export. The company employs 400 hands and has a turnover of about £150,000 a year. The principal products for export are acetic acid, amyl acetate, ethyl acetate, formaldehyde, 40 per cent. volume hexamethylentetramine, beechwood charcoal and creosote and wood naphtha. The company also manufacturing Isolite (bakelite) products.

Progress in the Study of Colour Vision

An Artificial Daylight Unit

AN illustration of the progress of scientific methods is afforded by the study of colour vision. In seeking to explain peculiarities in colour vision, failures and successes are encountered, particularly in regard to earlier work, which was carried out under conditions which rendered experimentation difficult and led to inaccuracy and doubt in the results achieved. Data of greater accuracy has been secured by recent investigations on the three-colour mixture curves of the spectrum, and new light has been thrown on the effects of macular pigmentation. It is hoped that further research will be in the direction of the problems surrounding saturation discrimination, effects of induction and colour blindness. Contemporary progress in physiological studies has led to efforts to approximate the various standpoints of physiology, psychology and physics. It is only during recent years that the quality of light, either natural or artificial, has been taken into consideration when dealing with this subject. Some uncertainty still exists concerning the extent to which light affects the eyes, but from a visual point of view, a good north light is usually the most satisfactory to work by, although it will be argued that it is of too cold a character. This, of course, can easily be rectified by creating a more colourful and cheerful environment.

The G.V.D. Precision Daylight Unit.

The G.V.D. artificial daylight unit produces both an accurate colour-matching light and at the same time a good light for general purposes. Its efficiency is high, namely 30 per cent. to 44 per cent., and its spectral distribution curve can be varied to resemble closely that of noon sunlight, overcast north skylight, or blue north skylight. Its salient points are accuracy, in the resemblance of its light to daylight; good illumination and distribution, with moderate current consumption; permanent colour correction qualities, and matching of colours of the most delicate shades under standardised conditions. The G.V.D. daylight unit enables work to continue through the darkest day without risk of error in the choice of colours, in grading goods, in tests made in chemical and analytical laboratories, and without risk of eye-strain, under working conditions exactly similar to those of daylight.

The unit is entirely British and is manufactured by G.V.D. Illuminators, Aldwych House, London, W.C.2.

Cellulose Acetate Scrap Film Utilisation

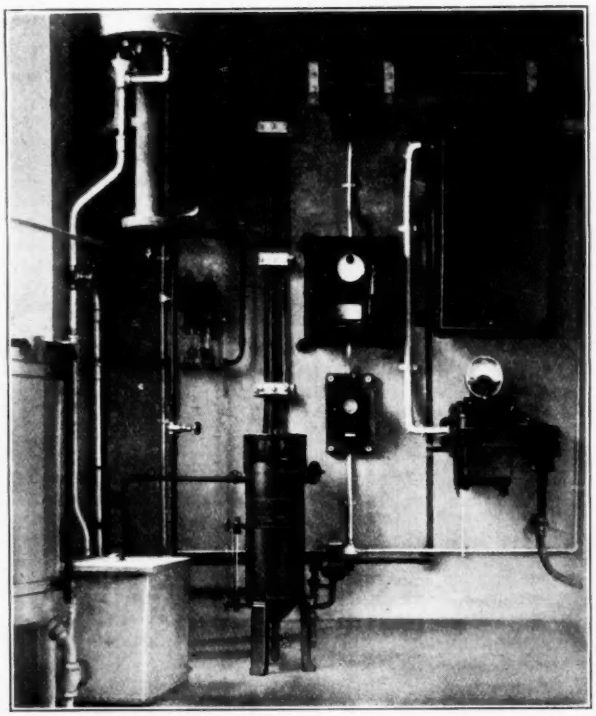
CELLULOSE acetate film of very low inflammability is becoming of increasing importance to the cinematograph world. In scrap form, after removal of gelatine, colouring matter and silver salts, acetate film can be worked up to aeroplane dopes, lacquers, transparent wrapping paper and plastic masses. For recovering the acetate for the latter purposes, J. Eggert ("Kunststoffe," March, 1933, page 51) recommends thorough washing of the scrap film with warm water followed by prolonged immersion in a solution of a gelatine-dissolving salt. Film coated with formaldehyde-hardened gelatine may require continued heating in the initial water bath to loosen the gelatine. The salt bath may take the form of a more or less concentrated solution of calcium chloride. Finally, a thorough mechanical cleansing of the acetate surface itself with the aid of a metal brush is essential for removal of the partially saponified topmost layer.

Distilling Water by Electricity

An Interesting Electrode Boiler Installation

THE accompanying illustration shows an interesting electrode boiler installation which is in operation at the Islington works of Milton Proprietary, Ltd., where it is used for the purpose of providing a supply of distilled water. This boiler, which was supplied by Bastian and Allen, Ltd., is rated at 30 kW, 200 volts, and it is working on a single-phase supply with one pole earthed. Owing to the long distance from the sub-station current is supplied through a transformer to prevent any possibility of earth currents being registered. The primary of the transformer is controlled by an Ellison oil-immersed circuit breaker and the secondary 200 volt mains are connected direct to the boiler terminals.

The automatic electrical control for starting and stopping the plant is unusual. The main switch is always left on, as no current passes unless there is water in the boiler. At a set time a time clock, which controls the plant, closes a 60 volt circuit taken from a tapping on the secondary of the transformer to the small motor feed pump fixed to the boiler shell. Water is thereby pumped into the boiler and current begins to pass as soon as the water reaches the bottom of the electrodes. As the water level rises the current increases until it reaches the load previously set on the patented control panel seen above the boiler. It will be obvious that if current fluctuates according to the water level, by controlling this level the steam output is also controlled. When, therefore, the water reaches the level to give the load for which the boiler is set, an electromagnetic relay is brought into operation which stops the pump, thus preventing any further increase in load. The level of the water then drops a little as more water is evaporated. This lowering of the water level slightly reduces the load until the relay goes out of operation, thus starting the pump again, and this process continues automatically.



Electrode Boiler Installation for Distilled Water

The steam raised is taken to a still shown on the left, where it is condensed in evaporating the still water. The condensate is returned to the boiler hotwell, from whence it is re-fed into the boiler. The still is of the indirect type, as the boiler evaporation is not used as the finished product, but fresh water taken through the still is vaporised steam from the boiler, then condensed and drawn off into glass-lined containers. The necessity for this arrangement is to make certain that the finished product is absolutely pure and to take no risk whatever of any particles of oil from the steam finding their way into the distilled water. At the moment the switching on by the time clock occurs a motor-operated valve opens and allows the water to pass through the still, and this valve is closed again by a float switch when the containers are full. The float switch also breaks the 60 volt circuit and stops the feed pump. The contents of the boiler are then quickly evaporated and the boiler automatically closed down. Apart from setting the time clock and adjusting the load control, the plant requires no attention whatever, and not only can advantage be taken of any special night rates for electricity, but time can be conserved by procuring a full supply of distilled water overnight to meet the daily demand. Very little space is taken up by the installation, and the boiler, which projects barely 18 in. from the wall, is capable of produring 90 lb. of steam per hour at any working pressure adjustable up to 120 lb. per square inch.

Power Alcohol from Molasses

Production Suggested in India

THE Associated Chambers of Commerce of India and Ceylon at their annual general meeting held at Calcutta, have passed a proposal urging that molasses as a by-product in sugar factories and refineries in India should be converted into industrial alcohols, for use as an internal combustion engine fuel. The sugar industry is one which the Government of India has undertaken to encourage. With the increase in the production of molasses with the rapid increase in the production of white sugar, the economic disposal of molasses is giving the manufacturers grave concern. The production of molasses in India in 1930 was estimated at 6,750,000 maunds; in 1932 it increased to 9,300,000 maunds.

Formerly the small quantity of molasses produced by the Indian sugar factories was taken up by the tobacco industry and in the manufacture of plain country spirits. Both of these industries, however, are not now consuming a quarter of the molasses they did ten years ago. If attempts are made to dispose of the molasses at no value, then the sugar industry will find it difficult to be self-supporting in time, and import tariffs may have to be further raised. The profitable disposal of this by-product is, therefore, essential to the success of the sugar industry in India. The only major outlets at present are the production of industrial alcohol, *i.e.*, rectified and denatured spirits, and the production of power alcohol.

Need for New Legislation

Before power alcohol could be produced and consumed on a large scale in India, it would require time for legislation so that Government would adjust its revenue duties to suit themselves and the petroleum companies. As the sugar factories grow in number during the next few years, much of their molasses can be taken up for conversion into denatured and rectified spirits, but to facilitate this and to ensure a reasonably lucrative market for Indian industrial alcohol, it must be further protected from foreign competition, without requiring the consumer to pay a higher price than he did in the immediate past. After this, as the molasses increase, the surplus can be utilised for power alcohol industry. These were some of the points raised by Mr. Arrindel in commending the proposal to the meeting of the Associated Chambers. It may be added that the estimated Indian consumption of petrol was 79,000,000 gallons in 1930-31 and 78,000,000 gallons in 1931-32. If the whole of 9 million maunds of molasses produced in India in 1932 were to be converted into alcohol, they would yield something like 23,000,000 gallons. Assuming that half of this production would consist of power alcohol, there would be 11,500,000 gallons of power alcohol to supplement the fuel supply.

British Association of Chemists

Progress of the Manchester Section

MR. C. B. WOODLEY, general secretary of the British Association of Chemists, addressed a meeting of the Manchester Section of the Association at the Engineers' Club, Manchester, on March 15. Mr. M. F. S. Choate presided, and Professor E. C. C. Baly, president of the Association, was present. Mr. Woodley said that in such an important industrial area as Manchester there were great opportunities to advance the interests of the association. The committee and a number of members in the section were devoting a great deal of time to this end, encouraging members to increase the membership by personal contact with chemists not yet members. Some 25 per cent. of the applications for membership received during the past five months had come from chemists in the Manchester Section.

The record of the unemployment benefit fund was magnificent. More than £8,500 had been paid out in benefit since its inception. The membership, and consequently the number of subscribers to the fund, had grown greatly, and it was consequently in a sound position financially. £300 had been placed to reserve last year despite the heavy call for benefit. He hoped that the next development would be the organisation of a pension scheme. With improved conditions, the reserves accumulated by the unemployment benefit fund would naturally increase. When the reserve stipulated by the actuary had been attained, the special purposes committee would consider the question of a pension scheme. Referring to the appointments bureau, Mr. Woodley said that during the past year 1,400 appointments had been notified for full members, probationers, and students, covering all branches of industry. Highly specialised knowledge was often called for and many members had received substantial salaries. Employers were not looking for the lower salaried men, but were carefully selecting those most suitable for their purpose, and offering adequate salary.

The success of the legal aid department was not sufficiently well known. There had been many successes in the Courts and the precedence of three months' notice for the chemist in the absence of agreement to the contrary had been firmly established by the association.

Professor BALY said he considered the association had a great future before it. Its activities were essential to the professional chemist and there was no doubt all chemists would ultimately be enrolled.

Dr. T. CALLAN, chairman of the local section of the Society of Chemical Industry, replying to the toast of "Our Guests" at the annual dinner of the section, said he would have been grateful if such an institution had been in existence 25 years ago when he needed the kind of help that the B.A.C. now affords. He had delayed becoming a member of the B.A.C. because of the multiplicity of scientific societies, and it was impossible to support all.

Professor BALY said that he could appreciate Dr. Callan's reason for not having become a member. He could visualise, however, a united society of which the B.A.C. would form an integral part. This society would have the three functions of service of (1) publishing and disseminating knowledge; (2) service to mankind; and (3) service to its own profession. He looked forward with confidence to the time when such a society had the standing of the British Medical Assocition.

Linseed Oil Industry in Northern France

THE crushing of imported oleaginous seed has become an important industry in northern France, in the departments of the Pas-de-Calais and the Nord, which section ranks second to Marseille as the most important production area in France. Since the war the industry has progressed considerably. While considerable flax is grown, no significant quantity of linseed is available. British India supplies most of the linseed with some consignments from South America. Dunkirk and Calais are the two main ports for imports of linseed. Although no statistics covering the annual output of linseed oil in this area are obtainable, crushers estimate the production at approximately 80,000 tons.

Scientific Disarmament

Major Lefebure on the Need for Investigation

SCIENTIFIC disarmament and security formed the subject of a paper read before the Liverpool Section of the Society of Chemical Industry, on March 17, by Major V. Lefebure. Mr. E. Gabriel Jones was in the chair. At first sight, the lecturer said, it might seem curious that a lecture should be given before the Society of Chemical Industry on the subject of disarmament. His reasons for ventilating certain aspects of disarmament before a technical group were in the first place that no matter what views were officially adopted, the fact remained that the background of the subject was definitely technical.

They were faced with two questions. First there was an unlimited number of possible ways to organise and distribute armaments from nation to nation. Secondly, if it was possible, what were the principles which should guide such redistribution, and what did the picture look like when the principles were applied to the details of national armament? He would assume for the purpose of their discussion that the first question was soluble. The second was essentially a technical question requiring technical consideration. It involved working principles, quantities, times and their consideration in relation to a specific effect or performance.

From a technical viewpoint, he suggested they should examine two things:—(1) How far had the official movement honestly examined those sections of armament and disarmament which must be examined if it could be claimed that the subject had received reasonable technical attention? (2) What detailed attention had the movement given in the case of one chosen section of the subject, say, chemical warfare?

After reviewing the history of disarmament the lecturer said that to follow the thread of discussion on chemical warfare through the movement was a deplorable but interesting experience. Starting with the Brussels Conference of 1920, the League Council put a series of questions to the technical body, *i.e.*, the Permanent Advisory Commission. They first asked whether the chemical weapon was crude; the commission answered that it was. The council asked whether quantitative methods could be employed in peace to check use in war. The commission, dealing with manufacture, replied that it would be useless to seek to restrict the manufacture of poison gases in peace. No facts, and no grounds of any sort, were advanced. It was not explained, for instance, that the chief, and practically all of the actual chemical casualty-producers were not actual commercial commodities. There would, therefore, in any case, be a definite conversion lag, and if such production was limited to state productions, there might be some value in such measures. No facts of any sort were given.

Regarding research, the commission simply replied that the prohibition of laboratory experiments was out of the question. No explanatory matter was given at all. It might have been pointed out, for example, that 99 per cent., if not 100 per cent., of all chemical warfare research was in state or controlled establishments, and that the problem turned on whether some regulations could be applied to such establishments, which was not a hopeless matter. Finally, after various arbitrary answers of this sort, useless to any statesman, the commission calmly referred the matter back to humanity.

New Russian Chemical Factories

A RUSSIAN chemical factory is to be installed this year near lake Dshaksy-Klytsch, where the water contains a high percentage of sodium chloride and glauber salts. Principally caustic soda and sodium chloride are to be produced there, and the cost of construction will amount to about 16 million roubles (about £2,000,000). In the Iwanowo-Woskressensk region another factory is in course of construction, for the manufacture of superphosphates. It is to have an annual capacity of 5,000 tons, and will utilise the phosphorite deposits of Makarow, which contain 23 per cent. of P_2O_5. Finally, the following factories have been set into operation: Sulphuric acid towers in the factory at Waskressensk and of the Newski Trust of Leningrad; a superphosphate factory in Chibin peninsula; new laboratories in the rubber factory at Jaroslawl; and different departments in the big chemical trust of Bobriki.

Chemical Industry Lawn Tennis Tournament

Men's Singles and Doubles This Year

LAWN tennis players, of whom there are some thousands in the chemical industry, will welcome the announcement that the Chemical Industry Lawn Tennis Tournament, for THE CHEMICAL AGE Silver Challenge Cup, which was run so successfully in 1932, is to be conducted on similar lines this year. In addition to the men's doubles, to which the tournament was confined in 1931 and 1932, there is to be a men's singles tournament on this occasion, a keen desire having been expressed by previous competitors for this additional opportunity of meeting their fellow members of the chemical industry.

The 92 players who participated in the 1932 tournament, and those who attended the final match at Oxted in September, were enthusiastic in their desire to see the contest extended, and we are looking forward to receiving a record number of entries from all parts of the country.

THE CHEMICAL AGE Silver Challenge Cup will be awarded to the winners of the men's doubles, and there will be a similar trophy for the winner of the singles. Precise details of the trophies will be announced later, but it should be mentioned that two cups have already been offered, one from Mr. W. Lloyd-Willey and another from his firm, Thomas Hill-Jones, Ltd., to be called the "Invicta" Cup.

In order to allow time for the playing off of the various rounds, it is desirable that entries should be sent in as early as possible, so that the draw may be completed immediately after the closing date. Entry forms may be obtained from the Editor of THE CHEMICAL AGE, Bouverie House, Fleet Street, London, E.C.4, and entrants are reminded that the last date for entries is May 1.

The tournament is limited to men's singles and men's doubles and is open to all engaged in any capacity in the chemical industry throughout the country. Country members of the industry are particularly invited to compete. Last year there was a fair representation from the provinces, but this year we hope to see a much larger entry outside London. For all the earlier rounds of the tournament, the country will again be divided into areas, so that in the earlier rounds at least, opposing players may obviate the inconvenience of travelling considerable distances and may meet each other as near home as possible.

The appended rules show how the tournament will be conducted, but there are some points that might be emphasised. It is desired to make the contest as wide as possible, and there will be no entrance fees. At the same time, it is essentially a chemical industry tournament, and every competitor must be engaged in the chemical industry, either as a principal or a member of the staff. Each pair must be members of the same, or an associated firm, but any number of pairs may enter from one firm. Last year, for example, one firm was represented by four pairs and four others by three each, and this year we should like to see some of the larger concerns sending in a dozen or even twenty entry forms.

The actual arrangements for playing the rounds are extremely simple. As soon as the draw and date for the first round are announced in THE CHEMICAL AGE, the opposing players will decide between themselves when and where the round is to be played. Immediately after the contest, all players will sign the result, which must be forwarded by the winners to the Editor of THE CHEMICAL AGE so as to reach him not later than first post on the day following the final date for playing off the round. The results and second round draw and date will then be announced, and the same procedure will be followed until the final, when special arrangements, which will be announced later, will be made for playing the final on hard courts in or near London.

Rules

1. Every competitor must be a member of the chemical industry, either as a principal or a member of a staff. There is no entrance fee of any kind.

2. Each pair in the Doubles Tournament must be members of the same, or an associated, firm.

3. The Challenge Cups shall be competed for annually on courts of any surface in accordance with the Rules of Lawn Tennis and the Regulations of the Lawn Tennis Association. The winners of the Cups shall make arrangements for their safe custody and insurance.

4. The competition shall be conducted on the knock-out principle, and the best of three advantage sets shall be played in all matches, except in the Final of the Singles, hen the best of five sets shall be played.

5. Entries shall be made not later than May 1, 1933, and addressed:

"Lawn Tennis Tournament,"
"The Chemical Age,"
Bouverie House,
Fleet Street, London, E.C.4.

6. The draw shall be made on the first convenient day following the close of entries. The dates on or within which the several rounds must be played will be published in THE CHEMICAL AGE.

7. The Editor of THE CHEMICAL AGE shall have the right to scratch any players who fail to play off their matches by the stipulated dates, or who otherwise fail to conform with the rules and regulations governing this competition.

8. Except in the case of the special period set apart for the final stages of the competition, players drawn against each other must make their own arrangements for playing off their match on a court mutually agreed upon. In the event of disagreement, the first name drawn shall have the right to choose the ground.

9. In the general interests of competitors throughout the country it has been decided to divide into areas as far as possible all matches up to, and including, the Semi-Finals, the rule as stated under Clause 8, however, still standing.

10. The result of each match must be sent by the winners to the Editor of THE CHEMICAL AGE, signed by all players (winners and losers) immediately after the match, and must reach the office of THE CHEMICAL AGE not later than by the first post on the day following the final day for playing off the round.

11. If any player be not present at the agreed place or time of the match, opponents shall be entitled to a walk-over, after having allowed reasonable time (say, a maximum of one hour) for the others' appearance. If the players find it impossible to play off their match on the day originally chosen, they must play it on any other day, to which both sides agree, within the stipulated period.

12. Any dispute arising between players, or otherwise, shall be referred to the arbitration of the Editor of THE CHEMICAL AGE, whose decision shall be final.

13. While competitors will make their own arrangements as to hard or grass courts for the preliminary rounds, it must be understood that the Finals will be played on hard courts.

New German Wood Preservative

A METHOD recently developed in Germany to obviate exposure losses of water soluble salts used for wood preservation uses chromium salts as a fixing agent to render the preservative salts insoluble. A preparation based on this principle has been manufactured for the last year or so under the trade name of "Thanalith U." The exact composition of this preparation is not revealed, the patent situation still being unsettled, but it is said to consist essentially of dinitrophenol fluorine and arsenic salts with chromium salts as a fixing constituent. This mixture is handled in the mechanical process of wood treatment. Its water solution is said to be stable at boiling temperature and non-corrosive to metals.

Foreign Scientific Apparatus

THE Association of Scientific Workers is making representations to the Import Duties Advisory Committee on one uneconomic aspect of the incidence of the existing 33⅓ per cent. ad valorem duty on imports of scientific apparatus. "This duty is levied," it is stated, "without modification irrespective of whether there is a competing source of supply in this country, with the consequence that where there is no competing source of supply the whole of the duty inevitably falls on the importer. In many instances there can be no competing source of supply, for the reason that the articles are protected by patent and the foreign patentees have declined to issue licences for the manufacture of the articles in this country."

Chemists' Assistants' International

Formulating a Co-operative Policy

FOR some years attempts have been made by the French Pharmacy Employees' Federation to establish a Chemists' Assistants' International, and to this end the Chemical Workers' Union, representing organised chemists' assistants in Great Britain, has been co-operating and assisting in securing contacts in Ireland, New Zealand, Australia, and South Africa. At the March meeting of the executive council of the Chemical Workers' Union, it was decided on the invitation of the French Federation to join the preliminary secretariat that is now in a position to advance the formation of an International Federation of Chemists' Assistants. Associations in France, Britain, Germany, Belgium, Czechoslovakia, Spain, Portugal, and South America have agreed to co-operate, whilst associations in the United States, Canada, South Africa, Norway, Sweden, Denmark, Holland, have undertaken to give the proposal favourable consideration.

A meeting of representatives from those countries agreeing to co-operate will be held shortly to formulate a manifesto on policy and methods of co-operation. This international federation brings into existence a powerful grouping of professional workers with a legal standing (dispensing and sale of poisons).

Action Against Wholesale Druggist

A Cough Mixture Ingredient

IN the King's Bench Division, on Monday and Tuesday, Mr. Justice Humphreys and a common jury had before them an action by Mr. Charles Fargher, of Splott Bridge, Cardiff, against Thomas Hodgkinson, Preston and King, wholesale druggists, of Bishopsgate, E.C., in respect of two barrels of oxymel of squills they had supplied him.

Plaintiff had carried on business in South Wales for some 40 years, and during that time he had been making and selling a cough mixture known as "Fargher's Balsom of Mulberry's" which had acquired a considerable reputation. He sold it in his own shop and also supplied it to wholesale and retail chemists. It contained eight ingredients, the basic one of which was oxymel of squills.

It was alleged that in October, 1928, defendants sold plaintiff two barrels, each containing 5 cwts. of oxymel of squills, which was warranted to be oxymel scillae B.P. 1885, prepared as directed in the British Pharmacopœia, dated 1885, from pure honey and containing no sucrose.

Oxymel Scillae B.P. 1885

Plaintiff's allegation was that the supply was not made from pure honey and contained about 24 per cent. of sucrose. As a result of that the cough mixture he made turned out to be worthless and he suffered damage.

Defendants, whilst admitting the warranty, denied that the oxymel of squills was not made from pure honey.

The jury, after hearing the whole of the evidence, answered the following questions in the affirmative. Was one of the casks adulterated with cane sugar, and was that the cause of the deposit in the bottles of cough mixture?

The jury were there discharged and the case will be mentioned again at a later date.

Sugar as Motor Fuel

Use in Internal Combustion Engines

THE absence of ash on combustion of sugar renders it applicable as a motor fuel. The special preparation of K. Cuker ("Osterr. Chem.-Zeitung," 1933, page 10), which ensures complete explosion in the motor, is made by dissolving 25 kg. sugar in 75 litres of alcohol containing 5 cc. nitric acid. A further 300 gram nitrated sugar (explosive agent) and a small percentage of naphthalene (denaturant) are added to the partially cooled solution. After neutralisation of excess acid with alcoholic ammonia, the liquid fuel which burns without ash can be introduced into the combustion chamber either by suction or by injection.

An Addition to Benn Journals

"The Newspaper World"

SIR ERNEST BENN, on behalf of his firm, has acquired the whole of the ordinary share capital in The Newspaper World Press, Ltd. The oldest of the newspaper trade journals, therefore, joins the biggest group of trade and technical journals in Europe, and will now have the advantage of association with the Bouverie House organisation. Mr. Charles Baker, the founder of the "Newspaper World," who for thirty-five years has been regarded as the guide, counsellor and friend of newspaper proprietors and their staffs, retains his interest and will remain in the position which he has occupied for the last few years as advisory editor. He has been joined on the board of the company by Mr. Gordon Robbins and Mr. Glanvill Benn. No alterations of any kind are being made in the personnel and staff, and the offices will be removed as soon as convenient to Bouverie House. Mr. Baker, who is eighty-two this year and the admitted father of the newspaper world, will complete his distinguished life of service to the press in the centre of Fleet Street. Sir Ernest Benn received the members of the "Newspaper World" staff at Bouverie House on Monday, and welcomed them into the Benn family of trade journals. He gave a specially hearty welcome to Mr. Charles Baker, the founder of the "Newspaper World" and now its advisory editor. Mr. Baker, in reply, expressed his satisfaction at his opportunity for close co-operation with Sir Ernest Benn, who had remarked that they stood for the same ideals in the great field of newspaper production. Mr. Baker emphasised the honesty and straightforwardness of the "Newspaper World" and the indispensable vocation which it was filling.

Death of Professor J. H. Thomson

Distinguished Record of Chemical Education

WE regret to record the death of Dr. John Millar Thomson, F.R.S., Emeritus Professor of Chemistry at King's College, London, which occurred at his home at Douro Place, Kensington, on Wednesday, in his eighty-fifth year. Professor Thomson began his long association with King's College in 1871, when, at the age of 22, he was appointed assistant demonstrator of chemistry, becoming senior demonstrator in 1879. In 1880 he was appointed Professor of Chemistry at Queen's College, London, but returned to King's College as Daniell Professor and head of the Department of Chemistry in 1887. He was vice-principal of the College from 1905 to 1914, when he retired after 27 years' tenure of his chair and was appointed Emeritus Professor. He was also an honorary Fellow of King's and Queen's Colleges. In recognition of his services to the College and to chemical education a John Millar Thomson medal was instituted to be awarded annually to the student of King's College who most distinguishes himself in the final year of the special honours course in the Department of Chemistry.

Professor Thomson was elected F.R.S. in 1897. He was secretary of the Chemical Section of the Society of Arts from 1879 to 1886, a member of council for four periods, hon. treasurer from 1907 to 1912, and vice-president in 1913. He served on the Council of the Chemical Society for four periods, was secretary from 1883 to 1897, and vice-president for two terms. Of the Institute of Chemistry he was hon. registrar from 1894 to 1900, vice-president for three periods, and president from 1900 to 1903. He was the author of publication on the composition and properties of ancient glasses, the chemistry of pigments, putrefaction and antisepsis, the chemistry of building materials and other technical subjects.

Large New Refinery in New Brunswick

NEGOTIATIONS are now in progress between the municipal authorities at Saint John, N.B., and the Gulf Refining Co., Pittsburg, Pa., U.S.A., for the establishment for a large new oil refinery at Saint John. The initial cost of the new plant would be about £150,000 with provision for expansion. At the start there would be a daily capacity of 2,000 barrels of oil of the type used by oil-burning vessels, and from 100 to 120 men would be employed. A suitable site for the plant has been selected at East Saint John.

News from the Allied Industries

Artificial Silk

A SCHEME OF RECONSTRUCTION was unanimously approved at an extraordinary general meeting of Alliance Artificial Silk, Ltd., held at Lowestoft on March 17. Mr. Frank J. Farrell, the chairman, said the proposals would allow for the writing off of every intangible asset, and place the balance sheet in a sound position.

Non-Ferrous Metals

A SLIGHTLY IMPROVED AVAILABLE BALANCE is reported by the British Aluminium Co. in respect of 1932 at £162,031, this figure being struck, as was the case last year, after setting aside £50,000 to depreciation reserve and £10,000 to the staff benefit fund. A year ago the dividend on the ordinary capital was cut down from 10 to 5 per cent. and the latter distribution is to be maintained for the past twelve months, the carry forward at £51,980 compared with £49,871 brought into the accounts. Reserve remains at £1,000,000 and the depreciation reserve will now stand at £1,100,000.

Seed Crushing and Oil Cake

THE REPORT of British Oil and Cake Mills, Ltd., for the year ended December, 1932, shows that the company did not quite maintain the very strong recovery achieved in 1931. The favourable tariff position enjoyed by the seed-crushing industry initially was somewhat marred by the imposition of the 10 per cent. import duty on Argentine linseed without a corresponding tariff on imported oil. Net profit for the twelve months ended December 31 last amounts to £514,282, against £666,162 secured in the previous year, and, with the balance of £28,333 brought in, there is a sum of £542,615 available for dividends. Distributions on the preference and preferred capital absorb £303,373, and it is proposed to declare a dividend of 8 per cent. on the ordinary capital, of which 5 per cent. has been paid as an interim, leaving a balance of £29,243 to be carried forward. For 1931 a dividend of 10 per cent. was paid on the ordinary shares, all of which are held by Lever Brothers.

Mineral Oil

SIR JOHN CADMAN, chairman of Anglo-Persian Oil Co., accompanied by several directors, will arrive in Teheran at the end of March in order to discuss the Anglo-Persian dispute.

THE PRESIDENT OF CHILE is asking Congress for a free hand to negotiate with a British and an American company for State control of the importation, distribution and retail sale of petrol.

Soap

RECORD PROFITS were made in 1932 by John Knight, Ltd., which is controlled by Lever Bros., the net figure being £272,500, which compares with £258,522 for 1931. Twelve months ago the dividend on the ordinary capital, which is held by the controlling company, was raised from a 20 to a 30 per cent. basis. There is a further advance in respect of 1932 to 45 per cent., the final payment now recommended being 25 per cent. The carry forward of £124,449 compared with £111,858 brought into the accounts.

Pottery Trades

IN HIS PRESIDENTIAL ADDRESS at the annual meeting of the National Society of Pottery Workers held at Burslem on March 18, Mr. R. Colclough called attention to the fact that silicosis had now been scheduled as an industrial disease. Not only the workers but the employers also were beginning to realise the serious effects which were caused by the use of flint. The research committee of the Pottery Workers' Society were not without hope of finding a substitute for flint which would minimise the risk of silicosis, and factory inspectors were also occupied with the same problem.

Chemical Notes from Overseas

Italian Castor Oil Plant

THE National Consortium of Growers of the Castor Oil Plant, of flax and of various other industrial plants in Italy is shortly to be formed in the city of Ferrara, where representatives of the Government, of the National Confederation of Fascist Syndicates of Agriculture, and of the Provincial Union of Fascist Syndicates of Agriculture, will gather for the purpose.

Extension to Canadian Abrasive Plant

THE Canadian Carborundum Co., Ltd., has completed and brought into operation an extension to its plant at Niagara Falls, Ontario, costing £50,000. Most of the machinery installed in the new plant was manufactured in Canada. This company manufactures abrasives at Niagara Falls, and at Shawinigan Falls. The expenditure contemplated will bring the total investment in Canada of the Carborundum Co., of Niagara Falls, up to a total of £550,000.

Czechoslovak Trade in 1932

DEVELOPMENTS in the chemical industry and trade of Czechoslovakia in 1932 resulted mainly from the declining activity of consuming industries and from a strong movement toward industrial self-sufficiency. Estimates, based on statistics of the first eleven months, indicate that exports of chemicals and allied products were well maintained at £2,200,000, imports were reduced to £3,480,000, and inland sales of domestic products declined to approximately £3,300,000. Economic developments were dominated by a strong nationalistic movement toward self-sufficiency in agricultural products. This trend was reflected in exchange regulations and restrictions, used to create additional protection for agricultural and industrial products. A sign of confidence is indicated by the increase of 10 per cent. in the stock exchange values of the securities of the ten largest chemical companies between the end of 1931 and 1932, although certain other industrial stocks showed great declines.

Trade in Sodium Silicate

BEFORE the war sodium silicate occupied an important place in the world markets. This situation is completely altered, since the industry has been developed in nearly every country. France and Germany, which used to be the chief competitors, only penetrate with the greatest difficulty to foreign markets. In Germany the production is considerably reduced, and the situation is hardly eased by the demands of the home markets which are diminishing. In France the industry is controlled by Henkel et Cie, and half of the sodium silicate produced is exported in spite of the decreased demand. The principal markets are in Holland, Belgium, Switzerland, Sweden, Norway, Italy, Austria and the Argentine.

Austrian Heavy Chemical Manufacture

AT the conclusion of the world war, the new State of Austria was dependent for the bulk of its chemicals upon outside sources, and chemical imports in the intervening period contributed materially to the adverse trade balance. This led to efforts toward self-sufficiency, particularly in heavy chemicals, an aim which was facilitated during the inflation period. This branch of industry was not affected materially by adverse conditions in 1925-26 but since 1930 a number of chemical plants closed. The situation with respect to the leading items is indicated by the following: Sulphuric acid production increased from 15,000 metric tons in 1924 to 53,800 tons in 1929 (total capacity 73,000 tons) and declined to an estimated 40,000 tons in 1931. Production of chrome alum and nitric acid have been temporarily suspended. Local production of caustic soda is replacing imports and stocks are relatively large. Production of ammonia, soda ash, sal soda, and potassium chlorate exceed the local demand while sodium chlorate is imported. Calcium carbide output far exceeds local demand, and exports are declining. Miscellaneous chemicals including compounds of aluminium, magnesium, zinc, boron, copper, and sodium, and the principal compressed gases are made in sufficient quantities for the local demand.

Weekly Prices of British Chemical Products

Review of Current Market Conditions

THE following market report is based on information supplied by the British manufacturers concerned, and unless otherwise qualified the figures quoted apply to fair quantities, net and naked at makers' works. Where no locality is indicated, the prices are general for the United Kingdom. Particulars of the London chemical market are specially supplied to THE CHEMICAL AGE by R. W. Greeff and Co., Ltd., and Chas. Page and Co., Ltd., and those of the Scottish chemical market by Chas. Tennant and Co., Ltd.

THE position of the London chemical market remains firm generally with a good steady demand. The coal tar products market remains inactive. Indications of slight easiness here and there have been in evidence on the Manchester chemical market during the past week but, for the most part, the general tendency is reasonably steady. Most sellers report relatively slow trading conditions so far as new bookings are concerned, and there is still little disposition among buyers to contract far ahead. The outlook for the consumption of chemicals in the textile and allied works in the district is not too bright, although, on the whole, deliveries have been about maintained at their recent level. There has been renewed activity in the heavy chemical market in Scotland and a general business improvement.

General Chemicals

ACETONE.—LONDON: £65 to £68 per ton; SCOTLAND: £66 to £68 ex wharf, according to quantity.

ACID, ACETIC.—Tech. 80%, £38 5s. to £40 5s.; pure 80% £39 5s.; tech., 40%, £20 5s. to £21 15s.; tech., 60%, £28 10s. to £30 10s. LONDON: Tech., 80%, £38 5s. to £40 5s.; pure 80%, £39 5s. to £41 5s.; tech., 40%, £20 5s. to £22 5s.; tech., 60%, £29 5s. to £31 5s. SCOTLAND: Glacial 98/100%, £48 to £52; pure 80%, £39 5s.; tech. 80%, £38 5s. d/d buyers' premises Great Britain. MANCHESTER: 80%, commercial, £39; tech. glacial, £52.

ACID, BORIC.—SCOTLAND: Granulated commercial, £26 10s. per ton; B.P. crystals, £35 10s.; B.P. powder, £36 10s. in 1-cwt. bags d/d free Great Britain in 1-ton lots upwards.

ACID, CHROMIC.—11d. per lb., less 2½%, d/d U.K.

ACID, CITRIC.—LONDON: 10d. per lb.; less 5%. MANCHESTER: 9½d.

ACID, CRESYLIC.—97/99% 1s. 3d. to 1s. 7d. per gal.; 99/100%, 1s. 7d. to 2s.

ACID, FORMIC.—LONDON: £52 per ton.

ACID, HYDROCHLORIC.—Spot, 3s. 9d. to 6s. carboy d/d according to purity, strength and locality. SCOTLAND: Arsenical quality, 4s.; dearsenicated, 5s. ex works, full wagon loads.

ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £53; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £18 to £20 per ton makers' works, according to district and quality. SCOTLAND: 80°, £23 ex station full truck loads.

ACID, OXALIC.—LONDON: 4Bs. to 57s. 6d. per cwt. according to packages and position. SCOTLAND: 98/100%, £49 to £52 ex store. MANCHESTER: £50 ex store.

ACID, SULPHURIC.—Average prices f.o.r. British makers' works, with slight variations owing to local considerations; 140° Tw. crude acid, £3 per ton; 168° Tw. arsenical £5 10s.; 168° Tw. non-arsenical, £6 15s. SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—10½d. per lb. SCOTLAND: B.P. crystals, 10½d., carriage paid. MANCHESTER: 10½d.

ALUM.—SCOTLAND: Lump potash, £9 per ton ex store.

ALUMINA SULPHATE.—LONDON: £8 5s. to £9 10s. per ton. SCOTLAND: £8 to £8 10s. ex store.

AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10d. to 1s. containers extra and returnable.

AMMONIA LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.

AMMONIUM CARBONATE.—SCOTLAND: Lump, £32 per ton; powdered, £34, in 5-cwt. casks d/d buyers' premises U.K.

AMMONIUM CHLORIDE.—£37 to £45 per ton, carriage paid. LONDON: Fine white crystals, £19 to £20. (See also Salammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

ANTIMONY OXIDE.—SCOTLAND: Spot, £24 per ton, c.i.f. U.K. ports.

ANTIMONY SULPHIDE.—Golden 6½d. to 1s. 1½d. per lb.; crimson, 1s. 3d. to 1s. 5d. per lb., according to quality.

ARSENIC.—LONDON: £22 14s. c.i.f. main U.K. ports for imported material; Cornish nominal, £23 f.o.r. mines. SCOTLAND: White powdered, £27 ex wharf; spot, £26. MANCHESTER: White powdered Cornish, £23 at mines.

ARSENIC SULPHIDE.—Yellow, 1s. 6d. to 1s. 8d. per lb.

BARIUM CHLORIDE.—£11 per ton.

BISULPHITE OF LIME.—£6 10s. per ton f.o.r. London, packages free.

BLEACHING POWDER.—Spot 35/37% £7 19s. per ton d/d station in casks, special terms for contract. SCOTLAND: £8 15s. in 5/6 cwt. casks.

BORAX, COMMERCIAL.—Granulated, £15 10s. per ton; powder, £17 packed in 1-cwt. bags, carriage paid any station Great Britain. Prices are for 1-ton lots and upwards.

CADMIUM SULPHIDE.—3s. 1d. to 3s. 5d. per lb.

CALCIUM CHLORIDE.—Solid 70/75% spot, £5 5s. to £5 15s. per ton d/d station in drums.

CARBON BISULPHIDE.—£30 to £32 per ton, drums extra.

CARBON BLACK.—3¾d. to 5¼d. per lb., ex wharf.

CARBON TETRACHLORIDE.—£41 to £46 per ton, drums extra.

CHROMIUM OXIDE.—10d. to 10½d. per lb., according to quantity d/d U.K. Green, 1s. 2d. per lb.

CHROMETAN.—Crystals, 3¾d. per lb. Liquor, £19 10s. per ton d/d.

COPPERAS (GREEN).—SCOTLAND: £3 15s. per ton, f.o.r. or ex works.

CREAM OF TARTAR.—LONDON: £4 5s. per cwt.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

FORMALDEHYDE.—LONDON: £28 per ton. SCOTLAND: 40%, £28 ex store.

LAMPBLACK.—£46 to £50 per ton.

LEAD ACETATE.—LONDON: White, £34 per ton; brown, £1 per ton less. SCOTLAND: White crystals, £34 to £36; brown, £1 per ton less. MANCHESTER: White, £32 10s.; brown, £30.

LEAD NITRATE.—£28 per ton.

LEAD, RED.—SCOTLAND: £28 10s. per ton d/d buyer's works.

LEAD, WHITE.—SCOTLAND: £40 per ton, carriage paid.

LITHOPONE.—30%, £18 to £19 per ton.

MAGNESITE.—SCOTLAND: Ground Calcined £9 per ton ex store.

METHYLATED SPIRIT.—61 O.P. Industrial 1s. 8d. to 2s. 3d. per gal. Pyridinised Industrial, 1s. 10d. to 2s. 5d. Mineralised, 2s. 9d. to 3s. 3d. 64 O.P. 1d. extra in all cases. Prices according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NICKEL AMMONIUM SULPHATE.—£52 per ton d/d.

NICKEL SULPHATE.—£52 per ton d/d.

PHENOL.—10d. to 11d. per lb. nomial.

POTASH, CAUSTIC.—LONDON: £42. MANCHESTER: £41.

POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. net d/d U.K. Discount according to quantity. Ground 5¾d. LONDON: 5d. per lb. with usual discounts for contracts. SCOTLAND: 5d. d/d U.K. or c.i.f. Irish Ports. MANCHESTER: 5d.

POTASSIUM CHLORATE.—3¾d. per lb. ex wharf London in 1-cwt. kegs. LONDON: £37 to £40 per ton. SCOTLAND: 99¾/100% powder, £37. MANCHESTER: £38.

POTASSIUM CHROMATE.—6½d. per lb. d/d U.K.

POTASSIUM NITRATE.—SCOTLAND: Refined Granulated £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 8½d. per lb. SCOTLAND: B.P. crystals, 9d. MANCHESTER: Commercial, 8½d. B.P., 8¾d.

POTASSIUM PRUSSIATE.—LONDON: 8½d. to 9d. per lb. SCOTLAND: Yellow spot material, 8½d. ex store. MANCHESTER: Yellow, 8½d.

SALAMMONIAC.—First lump spot, £42 17s. 6d. per ton d/d in barrels.

SODA ASH.—58% spot, £6 per ton f.o.r. in bags, special terms for contracts.

SODA, CAUSTIC.—Solid 76/77° spot, £14 10s. per ton d/d station. SCOTLAND: Powdered 98/99%, £17 10s. in drums, £18 15s. in casks, Solid 76/77%, £14 10s. in drums; 70/73%, £14 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. MANCHESTER: £13 5s. to £14 10s. contracts.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—£22 per ton. LONDON: £23 to £24.

SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. SCOTLAND: Refined recrystallised £10 10s. ex quay or station. MANCHESTER: £10 10s.

SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount according to quantity. Anhydrous, 5d. per lb. LONDON: 4d. per lb. with discounts for quantities. SCOTLAND: 4d. delivered buyer's premises with concession for contracts. MANCHESTER: 4d. less 1 to 3½% contracts, 4d. spot lots.

SODIUM BISULPHITE POWDER.—60/62%, £16 10s. per ton d/d 1-cwt. iron drums for home trade.

SODIUM CARBONATE (SODA CRYSTALS).—SCOTLAND: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality 7s. 6d. per ton extra. Light Soda Ash £7 ex quay, min. 4-ton lots with reductions for contracts.

SODIUM CHLORATE.—£32 per ton.

SODIUM CHROMATE.—3⅜d. per lb. d/d U.K.
SODIUM HYPOSULPHITE.—SCOTLAND: Large crystals English manufacture, £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals, £15 ex station, 4-ton lots. MANCHESTER: Commercial, £9 5s.; photographic, £15.
SODIUM NITRITE.—Spot, £19 to £22 per ton d/d station in drums.
SODIUM PERBORATE.—LONDON: 10d. per lb.
SODIUM PHOSPHATE.—£13 per ton.
SODIUM PRUSSIATE.—LONDON: 5d. to 5½d. per lb. SCOTLAND: 5d. to 5⅜d. ex store. MANCHESTER: 4¾d. to 5⅜d.
SODIUM SILICATE.—140° Tw. Spot £8 5s. per ton d/d station, returnable drums.
SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d. SCOTLAND: English material £3 15s.
SODIUM SULPHATE (SALT CAKE).—Unground Spot, £3 15s. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 2s. 6d.
SODIUM SULPHIDE.—Solid 60/62% Spot, £10 15s. per ton d/d in drums; crystals 30/32%, £8 per ton d/d in casks. SCOTLAND: For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 2s. 6d. d/d buyer's works on contract, min. 4-ton lots. Spot solid 5s. per ton extra. Crystals, 2s. 6d. per ton extra. MANCHESTER: Concentrated solid, 60/62%, £11 10s.; commercial, £8.
SODIUM SULPHITE.—Pea crystals spot, £13 10s. per ton d/d station in kegs. Commercial spot, £9 10s. d/d station in bags.
SULPHATE OF COPPER.—MANCHESTER: £15 10s. to £16 per ton f.o.b.
SULPHUR.—£12 per ton. SCOTLAND: Flowers, £11; roll, £10 10s.; rock, £9; ground American, £10 ex store.
SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.
SULPHUR PRECIP.—B.P. £55 to £60 per ton according to quantity. Commercial, £50 to £55.
VERMILION.—Pale or deep, 4s. 5d. to 4s. 9d. per lb.
ZINC CHLORIDE.—SCOTLAND: British material, 98%, £18 10s. per ton f.o.b. U.K. ports.
ZINC SULPHATE.—LONDON AND SCOTLAND: £12 per ton.
ZINC SULPHIDE.—1s. 1d. to 1s. 2d. per lb.

Intermediates and Dyes

IN the following list of intermediates delivered prices include packages except where otherwise stated:—
ACID, BENZOIC, 1914 B.P. (ex Toluol).—1s. 9½d. per lb.
ACID, GAMMA.—Spot, 4s. per lb. 100% d/d buyer's works.
ACID, H.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.
ACID, NEVILLE AND WINTHER.—Spot, 3s. per lb. 100% d/d buyer's works.
ACID, SULPHANILIC.—Spot, 8d. per lb. 100% d/d buyer's works.
ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.
ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.
BENZALDEHYDE.—Spot, 1s. 8d. per lb., packages extra.
BENZIDINE BASE.—Spot, 2s. 5d. per lb. 100% d/d buyer's works.
p-CRESOL 34.5° C.—1s. 9d. per lb. in ton lots.
m-CRESOL 98/100%.—2s. 3d. per lb. in ton lots.
p-CRESOL 34-5° C.—1s. 9d. per lb. in ton lots.
DICHLORANILINE.—2s. per lb.
DIMETHYLANILINE.—Spot, 1s. 6d. per lb., package extra.
DINITROBENZENE.—8½d. per lb.
DINITROTOLUENE.—48/50° C., 8½d. per lb.; 66/68° C., 9d. per lb.
DIPHENYLAMINE.—Spot, 2s. per lb., d/d buyer's works.
α-NAPHTHOL.—Spot, 2s. 4d. per lb.., d/d buyer's works.
β-NAPHTHOL.—Spot, £78 15s. per ton in paper bags; £79 15s. in casks, in 1-ton lots.
α-NAPHTHYLAMINE.—Spot, 11½d. per lb., d/d buyer's works.
β-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb. d/d buyer's works.
o-NITRANILINE.—5s. 10d. per lb.
m-NITRANILINE.—Spot, 2s. 7d. per lb. d/d buyer's works.
p-NITRANILINE.—Spot, 1s. 8d. per lb. d/d buyer's works.
NITROBENZENE.—Spot, 4½d. per lb.; 5-cwt. lots, drums extra.
NITRONAPHTHALENE.—9d. per lb.
SODIUM NAPHTHIONATE.—Spot, 1s. 9d. per lb.
o-TOLUIDINE.—Spot, 9½d. per lb., drums extra, d/d buyer's works.
p-TOLUIDINE.—Spot, 1s. 11d. per lb., d/d buyer's works.
m-XYLIDINE ACETATE.—3s. 6d. per lb., 100%.

Coal Tar Products

ACID, CARBOLIC.—Crystals, 9d. to 11d. per lb.; crude, 60's, 1s. 11d. to 2s. per gal.; 2% water, 3s. 0¾d. MANCHESTER: Crystals, 9¼d. per lb.; crude, 2s. 5d. per gal. SCOTLAND: 60's, 1s. 7d. to 1s. 8d.
ACID, CRESYLIC.—99/100%, 11d. to 1s. 8d. per gal.; pale 95%, 11d. to 11½d.; dark, 10d., all according to specification; refined, 1s. 8d. to 1s. 9d. LONDON: 98/100%, 1s. 3d.; dark, 95/97%, 11d. SCOTLAND: Pale 99/100%, 1s. 3d. to 1s. 4d.; 97/99%, 1s. to 1s. 1d.; dark 97/99%, 11d. to 1s.; high boiling acid, 2s. 6d. to 3s.
ANTHRACENE OIL.—Strained, 4½d. per gal.
BENZOL.—At works, crude, 10d. to 11d. per gal.; standard motor, 1s. 6½d. to 1s. 7d.; 90%, 1s. 7d. to 1s. 8d.; pure, 1s. 10d. to 1s. 11d. LONDON: Motor, 1s. 7½d. SCOTLAND: Motor, 1s. 6½d. to 1s. 7½d.; 90%, 2s. 0½d. to 2s. 1½d.
CREOSOTE.—Standard for export, 4½d. to 5d. net per gal. f.o.r. for Home, 3¾d. d/d. LONDON: 3d. to 3½d. f.o.r. North; 4d. to 4½d. London. MANCHESTER: 2½d. to 3¾d. SCOTLAND: Specification oils, 3¾d. to 4¼d.; washed oil, 4d. to 4½d.; light, 3¾d. to 4¼d.; heavy, 4½d. to 5d.
NAPHTHA.—Solvent 90/160%, 9d. to 1s. 2d. per gal.; 95/160%, 1s. 7d. to 1s. 8d.; 90/160%, 1s. 1d. to 1s. 2d. LONDON: Solvent, 1s. 3½d. to 1s. 4d.; heavy, 11d. to 1s. 0½d. f.o.r. SCOTLAND: 90/160%, 1s. 3d. to 1s. 3½d.; 90/190%, 11d. to 1s. 2d.
NAPHTHALENE.—Crude, Hot-Pressed, £6 1s. 3d. per ton. Flaker, £10 per ton. Purified crystals, £9 10s. per ton in bags. LONDON: Fire lighter quality, £3 to £3 10s.; 74/76 quality, £4 to £4 10s.; 76/78 quality, £5 10s. to £6. SCOTLAND: 40s. to 50s.; whizzed, 65s. to 70s.
PITCH.—Medium soft, £4 10s. to £4 15s. per ton. MANCHESTER: £4 2s. 6d. to £4 7s. 6d. f.o.b. LONDON: £4 5s. to £4 10s. f.o.b. East Coast port.
PYRIDINE.—90/140, 3s. 9d. per gal.; 90/160, 4s. to 4s. 6d.; 90/180, 2s. to 2s. 6d. SCOTLAND: 90/160% 4s. to 5s.; 90/220%, 3s. to 4s.

Wood Distillation Products

ACETATE OF LIME.—Brown, £8 10s. to £8 15s. per ton. Grey £10 10s. to £12. Liquor, brown, 30° Tw., 6d. per gal. MANCHESTER: Brown, £1; grey, £12.
ACETIC ACID, TECHNICAL, 40%.—£16 10s. to £18 per ton.
AMYL ACETATE, TECHNICAL.—95s. to 110s. per cwt.
CHARCOAL.—£6 to £11 per ton.
WOOD CREOSOTE.—6d. to 2s. per gal., unrefined.
WOOD NAPHTHA, MISCIBLE.—2s. 7d. to 4s. per gal. Solvent, 3s. 9d. to 4s. 9d. per gal.
WOOD TAR.—£2 to £6 per ton.
REFINED COAL TAR.—SCOTLAND: 4¾d. to 5d. per gal.
XYLOL.—Common, 1s. 11d. to 2s. per gal.; pure, 2s. to 2s. 2d.
TOLUOL.—90%, 1s. 11d. to 2s. per gal.; pure, 2s. 3d.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—Export, £6 per ton f.o.b. U.K. ports in single bags; home, £6 10s. per ton, delivered in 6-ton lots to consumer's nearest station.
NITRATE OF SODA.—£8 16s. per ton, delivered in 6-ton lots to consumer's nearest station.
CYANAMIDE.—£7 per ton, delivered in 6-ton lots to consumer's nearest station.
NITRO-CHALK.—£7 5s. per ton, delivered in 6-ton lots to consumer's nearest station.
CONCENTRATED COMPLETE FERTILISERS.—£10 9s. 6d. to £11 per ton according to percentage of constituents as follows:—

	PERCENTAGE OF CONSTITUENTS.				
	Nitrogen.	Phosphoric Acid. Water Soluble.	Insol.	Potash.	Price per Ton.
No. 1	12.5	12.5	—	15.0	10 14 0
No. 2	10.4	10.4	—	20.8	10 16 0
No. 4	10.4	20.8	—	10.4	10 12 6
No. 5	8.0	16.0	5.5	16.0	10 9 6
No. 6	7.5	26.0	6.0	7.5	11 0 0
No. 7	6.5	22.5	3.0	13.0	10 12 6

The above prices are for delivery to farmer's nearest station in 6-ton lots packed in 1 cwt. bags supplied free by the sellers.

Pharmaceutical and Fine Chemicals

IRON QUININE CITRATE, B.P.—9½d. to 9¾d. per oz.
QUININE SULPHATE.—1s. 10d. per oz.

Latest Oil Prices

LONDON, March 22.—LINSEED OIL was slow. Spot, small quantities, £18 10s.; April, £15 12s. 6d.; May-Aug., £16 10s.; Sept.-Dec., £17 5s., naked. RAPE OIL was slow. Crude extracted, £29; technical refined, £30 10s., naked, ex wharf. COTTON OIL was quiet. Egyptian crude, £20; refined common edible, £22 10s., and deodorised, £24 10s. naked, ex mill. TURPENTINE was dull. American spot, 62s. per cwt.

HULL.—LINSEED OIL.—Spot quoted £16 2s. 6d.; March, £15 12s. 6d.; April, £15 15s.; May-Aug., £16 12s. 6d.; Sept.Dec., £17 10s. per ton. COTTON OIL.—Egyptian crude, spot, £18 15s.; edible refined, spot, £21 15s.; technical, spot, £21 15s.; deodorised, £23 15s. per ton, naked. PALM KERNEL OIL.—Crude, f.m.q., spot, £19 per ton, naked. GROUNDNUT OIL, crushed-extracted, spot, £24 10s.; deodorised, £28 10s. per ton. RAPE OIL, crushed-extracted, spot, £28; refined, £29 10s. per ton. SOYA OIL, crushed-extracted, spot, £19 10s.; deodorised, £22 10s. per ton. COD OIL, March-April, 18s. per cwt. CASTOR OIL.—Pharmaceutical, spot, 39s. 6d.; first, 34s. 6d.; second, 30s. 6d. per cwt. TURPENTINE, American, on the spot, 63s. 6d. per cwt.

Inventions in the Chemical Industry

Specifications Accepted and Applications for Patents

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications Accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Mercerising Textiles

NATURAL or artificial cellulose textile materials are mercerised with liquid ammonia. For example, hanks or fabrics of hydrated cellulose artificial silk may be immersed in liquid ammonia, without tension or under slight tension, drained and subjected to reduced pressure to remove the remaining ammonia. The treatment may be effected at ordinary pressure at a temperature below the boiling point of ammonia. (See Specification No. 374,971 of I. G. Farbenindustrie.)

Refining Motor Spirit

HYDROCARBON motor spirit is freed from resins and resin-forming compounds and so rendered stable on storage by treatment at atmospheric pressure with diluted sulphuric acid below 40° C. and then with alkali while hot. Neutralisation with cold alkali may precede the hot alkali treatment. For example, crude motor spirit is stirred with 3 per cent. of 60° Bé acid, separated, washed with 1 per cent. of 18 per cent. soda lye, and distilled with 1 per cent. of 18 per cent. lye first by indirect and then by direct steam. (See Specification No. 371,752 of Gewerkschaft M. Stinnes.)

Treatment of Vegetable Lecithin

VEGETABLE lecithin is bleached and its emulsifying capacity increased by treatment with benzoyl peroxide, with or without other peroxides such as hydrogen peroxide, sodium peroxide, or barium peroxide, or persalts such as sodium percarbonate or sodium perborate. The treatment may be carried out by intimately mixing the lecithin with 0.4 per cent. of benzoyl peroxide while warming. When mixing lecithin with fat and oil and the resulting fine colloidal dispersion with water, improved results are obtained using lecithin thus treated. (See Specification No. 372,232 of Hanseatische Muehlenwerke A.G.)

Inhibiting the Action of Acid on Metal

IN pickling or cleaning metals with dilute sulphuric acid a small proportion of "a natural or synthetic ichthyol or ichthyol sulphonate" is added to the acid to prevent attack of the metal. Natural ichthyol products are prepared by the sulphonation with concentrated sulphuric acid or oleum of sulphur-containing oils obtained by low temperature carbonisation of certain oil shales. The acids or their soluble salts may be used. Synthetic ichthyols or ichthyol sulphonates are prepared by sulphonation of the product obtained by treating mineral oils with sulphur at about 200° C. or by the sulphurisation of sulphonated mineral oils. The ichthyol products contain at least 9 per cent. of sulphur, probably in the form of sulphones and thiophens. Dry or pasty products for addition to the pickling or cleaning acid may be obtained by mixing the ichthyol product with salt or a foam-producing agent. (See Specification No. 370,871 of Imperial Chemical Industries, Ltd.)

Synthesis of Higher Alcohols

HIGHER alcohols are synthesised by passing a mixture of hydrogen and an oxide of carbon, the proportion of the latter not exceeding 10 per cent. of the total volume, over an alcohol-forming catalyst at a temperature exceeding 300° C. and a pressure of at least 100 atmospheres. Preferably the velocity of the gases is such that the proportion of carbon monoxide in the reacting gases does not exceed 8 per cent. The catalyst may comprise a mixture of at least one irreducible oxide with a small amount of an alkali metal oxide; reducible oxides, such as copper oxide, may also be present. The oxides of manganese, zinc, chromium and vanadium are mentioned as suitable irreducible oxides. Examples of catalysts are oxides of manganese, copper and potassium; oxides of zinc, chromium and potassium; oxides of chromium, manganese and potassium; oxides of copper, zinc and potassium; oxides of zinc, manganese and potassium; oxides of manganese copper, chromium and potassium. (See Specification No. 371,804 of Imperial Chemical Industries, Ltd.)

Specifications Accepted with Dates of Application

REDUCTION COMPOUNDS OF NON-BENZENOID ACETYLENE POLYMERS AND METHODS OF PREPARING THE SAME.—W. W. Triggs (E. I. Du Pont de Nemours and Co.). May 30, 1931. 389,108.

MANUFACTURE OF EMULSIONS OF VINYLACETYLENES OR THEIR POLYMERS OR REDUCTION PRODUCTS, AND OF SYNTHETIC RUBBER THEREFROM.—W. W. Triggs (E. I. Du Pont de Nemours and Co.). May 30, 1931. 389,109.

MANUFACTURE OF HALOGENATED UNSATURATED NON-BENZOID ACETYLENE POLYMERS OR THEIR REDUCTION PRODUCTS.—W. W. Triggs (E. I. Du Pont de Nemours and Co.). June 4, 1931. 389,122.

PRODUCTION OF MIXED SALTS CONTAINING AMMONIACAL AND NITRATE-NITROGEN JOINTLY. Ruhrchemie Akt.-Ges. July 5, 1930. 389,082.

PRODUCTION OF FERTILISING MATERIALS. F. Uhde. Aug. 2, 1930. 389,111.

SEPARATION OR PURIFICATION OF LUBRICATING OILS.—J. Y. Johnson (I. G. Farbenindustrie). Aug. 6, 1931. 389,113.

METHOD OF, AND APPARATUS FOR, PREVENTING OR DISSOLVING INCRUSTATION IN STEAM BOILERS, ECONOMISERS, OR THE LIKE.—A. Marques, E. F. Abecassis and M. Polleri. Sept. 8, 1931. 389,130.

PROCESS OF SEPARATING 1-NAPHTHYLAMINE-5-SULFONIC ACID FROM ITS ISOMERS.—J. M. Tinker. Sept. 8, 1931. 389,098.

PREPARATION OF RESINOUS CONDENSATION PRODUCTS FROM PHENOL AND FORMALDEHYDE.—Bakelite Ges. Sept. 9, 1930. 389,099.

STRENGTHENED OR SAFETY GLASS.—Triplex Safety Glass Co., Ltd., L. V. D. Scorah and J. Wilson. Sept. 9, 1931. 389,115.

DIRECT HYDRATION OF OLEFINES.—H. Dreyfus. Sept. 11, 1931. 389,133.

MANUFACTURE OF ACETALDEHYDE.—H. Dreyfus. Sept. 11, 1931. 389,134.

MANUFACTURE OF ACETALDEHYDE.—H. Dreyfus. Sept. 11, 1931. 389,135.

MANUFACTURE OF ALIPHATIC ALCOHOLS.—H. Dreyfus. Sept. 11, 1931. 389,136.

PROCESS FOR TREATING LIQUOR EMPLOYED IN KIERS AND THE LIKE.—Roessler and Hasslacher Chemical Co. and T. D. Ainslie. Sept. 11, 1931. 389,138.

VULCANISATION OF RUBBER. Roessler and Hasslacher Chemical Co. Sept. 15, 1930. 389,139.

DETERGENTS.—E. A. Bjorn. Sept. 24, 1930. 389,154.

DYEING WOOL BY MEANS OF VAT-DYESTUFFS.—Durand and Huguenin Akt. Ges. Sept. 22, 1930. 389,156.

APPARATUS FOR TESTING THE LUBRICATING PROPERTIES AND VALUES OF OILS.—Vigzol Oil Refining Co. (London), Ltd., and P. Bilton. Oct. 6, 1931. 389,163.

WORKING UP GASES CONTAINING HYDROCARBONS IN ELECTRIC ARCS.—J. Y. Johnson (I. G. Farbenindustrie). Oct. 16, 1931. 389,165.

MANUFACTURE AND PRODUCTION OF LIQUID HYDROCARBONS OF THE BENZENE SERIES.—J. Y. Johnson (I. G. Farbenindustrie). Oct. 30, 1931. 389,171.

PROCESS FOR PRODUCING CELLULOID-LIKE ARTIFICIAL MASSES. Rheinisch-Westfalische Sprengstoff Akt.-Ges. Oct. 30, 1930. 389,173.

PROCESS FOR PRODUCING WASTE LIQUORS WITH A HIGH CONTENT OF ORGANIC SUBSTANCES IN THE DIGESTION OF SULPHITE PULP. Patentaktiebolaget Grondalramen. Jan. 9, 1931. 389,218.

PROCESS OF AND APPARATUS FOR THE ELECTRICAL SEPARATION OF SUSPENDED PARTICLES FROM GASEOUS FLUIDS. Lodge-Cottrell, Ltd. Jan. 25, 1932. 389,237.

ELECTRODES FOR CARRYING OUT ELECTRO-CHEMICAL PROCESSES AND PROCESSES OF ELECTROLYSIS EMPLOYING THE SAME. E. Berl. Jan. 30, 1932. 389,244.

PROCESS FOR THE MANUFACTURE OF CONDENSATION PRODUCTS. Schering-Kahlbaum Akt. Ges. May 23, 1931. 389,310.

PROCESS AND APPARATUS FOR THE MANUFACTURE OF CELLULOSE PRODUCTS.—J. P. Bemberg Akt.-Ges. July 6, 1931. 389,336.

MANUFACTURE OF INDIGOID VAT-DYESTUFFS. Soc. of Chemical Industry in Basle. July 25, 1931. 389,350.

PRODUCTION OF ALUMINA AND ALKALI PHOSPHATES. Chemische Werke Vorm. H. and E. Albert. July 25, 1931. 389,359.

LITHIUM ALLOYS AND ELECTROLYTIC PROCESS OF PRODUCING THE SAME.—H. Osborg. July 4, 1931. 389,150.

PRODUCTION OF PROTECTIVE COATINGS RESISTANT TO LIQUID FUELS. G. Ruth Akt. Ges. and Dr. E. Asser. Oct. 6, 1932. 389,411.

Applications for Patents

AQUEOUS DISPERSIONS OF THERMOPLASTIC HYDROCARBON MATERIALS, ETC.—Bennett, Inc. March 18. (United States, March 18, '32.) 8284.

MANUFACTURE OF AMINO-NAPHTHOL SULPHONIC ACIDS, ETC.—Chemische Fabrik vorm. Sandoz. March 15. (Germany, April 9, '32.) 7871, 7872.

PHOTOSENSITIVE SELENIUM CELL.—C. Chilowsky. March 17. (France, March 17, '32.) 8119.

REDUCTION OF ORES, OXIDES, ETC.—H. E. Coley. March 15. 7857.

MANUFACTURE OF NAPHTHOYL BENZOIC ACID DERIVATIVES.—E. I. Du Pont De Nemours and Co. March 16. (United States, March 16, '32.) 8021. 8022 (cognate with 8021).

ALUMINIUM ALLOYS.—Dürener Metallwerke Akt. Ges. and K. L. Meissner. March 13. (July 29, '32.) (Germany, Sept. 12, '31.) 7634.

EXTRACTING METALS FROM ORES.—C. Goetz. March 17. (Germany, April 1, '32.) 8204. (Germany, Sept. 24, '32.) 8205 (cognate with 8204). (Germany, Oct. 13, '32.) 8206 (cognate with 8204).

MANUFACTURE OF HIGH MOLECULAR THIOSULPHURIC ESTERS.—Henkel et Cie Ges. March 16. 8035.

ELECTROLYTIC CELLS AND PROCESSES.—I. G. Farbenindustrie. March 13. (Germany, March 12, '32.) 7577.

MANUFACTURE OF 1.4-DIAMINO-2-ARYLOXY-ANTHRAQUINONE-3-SULPHONIC ACIDS.—I. G. Farbenindustrie. March 14. (Germany, March 15, '32). 7748.

ELECTROLYTIC CELLS.—I. G. Farbenindustrie. March 13. (Germany, March 16, '32.) 7878.

DECOMPOSING MONAZITE SAND.—I. G. Farbenindustrie. March 17. (Germany, April 25, '32.) 8191.

MANUFACTURE OF SAFETY EXPLOSIVES.—Imperial Chemical Industries, Ltd. March 14. 7766.

PRINTING INKS.—Imperial Chemical Industries, Ltd. March 15. 7889.

METHOD OF INCREASING VISCOSITY OF MINERAL OILS, ETC.—Imperial Chemical Industries, Ltd. March 17. 8195.

MANUFACTURE OF NITROGENOUS CONDENSATION PRODUCTS.—J. Y. Johnson (I. G. Farbenindustrie). March 13. 7575.

CATALYTIC OXIDATION OF KETONES.—J. Y. Johnson (I. G. Farbenindustrie). March 17. 8132.

MANUFACTURE OF DYESTUFFS FOR ANIMAL FIBRES.—J. Y. Johnson (I. G. Farbenindustrie). March 17. 8133.

MANUFACTURE OF SULPHUR.—J. Y. Johnson (I. G. Farbenindustrie). March 18. 8272.

MANUFACTURE OF CONDENSATION PRODUCTS FROM ALCOHOLS AND PHENOLS.—C. B. Maddocks. March 17. 8125.

OBTAINING ANHYDROUS ETHYL AND METHYL ALCOHOL FROM CRUDE SPIRIT.—Reichsmonopolverwaltung für Branntwein. March 15. (Germany, March 15, '32.) 7875.

MAKING RESINOUS CONDENSATION PRODUCTS. A. Spitzer. March 13. (Germany, March 12, '32.) 7643.

From Week to Week

LORD LEVERHULME arrived at Algiers last Saturday, on a business tour.

DYEING OF LEATHER was the subject of an address by Mr. T. Wilson, of Bradford, before the West Riding Section of the Society of Dyers Colourists on March 17. He gave details of the methods applied in tanning morocco and reptile leathers.

THE BODIES OF EIGHT GIRLS were recovered from the ruins of the factory of the Canada Match Company at Hull (Quebec), which was burned down on March 15 following an explosion in a mixing tank. Sixteen girls are missing and twenty-one injured are in hospital.

THE COMPLETE RE-OPENING of the Skinningrove Iron and Steel Works will be accomplished on Monday, April 3. It is also understood that in the first week of next month Dorman, Long and Co. will blow in a furnace at their Cleveland works for the manufacture of ferro-manganese iron.

THE CHILEAN MINISTER OF FINANCE, on March 15, confirmed the report that the Government would suspend the sixty gold pesos per ton allowance on nitrate exports on behalf of foreign creditors and bondholders. It is believed the allowance will be replaced by an export tax, the proceeds of which will be devoted to the assistance of industry and to balance the national Budget.

THE ALLIED BREWERY TRADERS' ASSOCIATION decided on Monday at its annual meeting in London that because of the bad state of the industry the annual banquet will not be held. The question of the abandonment of the Brewing Trade Exhibition was also raised, as it was felt that this could not be successfully accomplished unless there was some relief from the heavy taxation, but the matter was left over for further consideration.

THE SITE of the old Muspratt Chemical Works at Widnes has been taken over by Albright and Wilson, chemical manufacturers, of Birmingham. For some months demolition of the old chemical works has been in progress, and is now completed, ready for rebuilding to the requirements of the new firm. One of the primary reasons for establishing in Widnes is the close proximity to the manufacture of heavy chemicals, which will be used largely in the new industry.

THE ANNUAL MEETING of the South Wales section of the Society of Chemical Industry was held last week at the Technical College, Cardiff, when Dr. H. B. Watson, the retiring chairman, presided over a representative gathering of members. Mr. C. M. W. Grieb, Swansea, was elected chairman for the ensuing year, with Mr. Wilfred Grey-Davies, Tonda, vice-chairman. Mr. George Madel, Swansea, and Mr. Ernest A. Rudge, Cardiff, were re-elected joint hon. secretaries, and Mr. J. H. Wells, Swansea, hon. treasurer.

THE EXPLOSION OF A STEEL NAPHTHA DRUM at Harrington Coke Ovens, Lowca, near Whitehaven, on Tuesday, killed a workman named Walker. The workman, who was a welder, was in a shed repairing part of the drum and was welding with an acetylene lamp when the explosion occurred. The roof of the shed was shattered and Walker was killed instantly, his injuries including a broken neck. A boy who was assisting escaped with a shock. The naphtha drum was empty, but it is thought the explosion was the result of an accumulation of vapour caused by heat from the blow-flame.

THE EMPLOYEES of Irvine Bank Dyeworks, Irvine, have contributed £35 7s. to Kilmarnock Infirmary.

THE NEW GENERAL SECRETARY of the Amalgamated Society of Dyers is to be Mr. G. H. Bagnall, at present organising secretary of the North-West Area of the society. He polled 8,901 votes in the final ballot. Second place was taken by Mr. John Dougherty, Scottish district secretary, who polled 4,737.

THE LANCASHIRE COTTON CORPORATION has under consideration the opening of Bridge Mill, Hopwood, as a dyeworks, and if a proposal is carried out there will be employment for between 150 and 200 people. The mill, which has been closed since 1931, was formerly used for the manufacture of cotton goods.

THE PRINCIPAL'S REPORT for 1931-32 of the Imperial College of Tropical Agriculture, St. Augustine, Trinidad, has just been issued. Among the work carried out there was an investigation on the hydrolysis of bagacillo during clarification under laboratory conditions. Much research has been carried out under the control of the professor of chemistry on soil research.

AT A MEETING of the Board of the Institute of Physics, held on March 14, the following were elected to membership: Fellows, D. B. Deodhar, L. G. H. Huxley, K. S. Krishnan, T. S. Littler, J. J. McHenry, A. L. Reimann, M. D. Waller; Associates, C. H. Edlin, R. N. Ghosh, D. O. Jones, R. Levi, F. H. Parker, H. J. H. Starks, P. C. Varley; Student Members, E. H. Dock, H. P. Woods.

THE PAINT INDUSTRY AT HULL is showing signs of improvement. Orders are coming in from all parts of the world, especially from South America. One Hull firm is stated to have received orders for some hundreds of tons of paint manufactured specially for use in tropical climates. Another Hull paint manufacturer is producing brilliantly coloured enamel which can be applied direct to metal or wood, and provides a dazzling lustre without "stoving."

THE BRITISH STANDARDS INSTITUTION has recently issued its half-yearly handbook which includes an indexed list of the British Standard Specifications. The activities of the three divisions—Engineering, Building and Chemical, as indicated in the list of new specifications in preparation—provides interesting reading and shows the valuable work voluntarily carried out by the Institution. The list, which covers forty pages, includes both a numerical list and a complete subject index of B.S. Specifications, and should be of value to the engineering, chemical and allied industries who have found the British standards of such assistance in the preparation of contracts and tenders. Copies of the publication are available from the British Standards Institution (Publications Department), 28 Victoria Street, London, S.W.1, price 1s. 2d. post free.

ALBANIAN OIL, it is hoped, will soon be put on the Italian market as a result of the work that has been in progress for some years past on the Italian Government's concession in Albania. The managing director of the organisation does not expect production to meet more than a small proportion of the domestic needs of Italy. A Bill authorising a grant of 200,000,000 lire (approximately £3,000,000) for development work in 1933-34 has just passed the Chamber of Deputies. Besides the Italian concern, which is a branch of the Italian State Railways, the Anglo-Persian Oil Co. has a concession in Albania.

THE RECENT GROWTH of the fruit canning industry in Kent is adding one more enterprise to the list of important Kentish industries which depend upon the work of the trained industrial chemist. In this connection the Senior Departments of the Medway Technical College, Gillingham, are keeping well abreast of the times, in the organisation of advanced professional and industrial part-time training courses to meet the developing demand on the part of works chemists and assistants. These courses extend over five years, and are attended by chemists and assistant chemists from paper mills, cement works, breweries, fruit canneries and similar industrial concerns, and the attendance of students shows a rapid growth.

THE INSTITUTION OF CHEMICAL ENGINEERS will hold a joint meeting with the Chemical Engineering Group and Liverpool Section of the Society of Chemical Industry at Liverpool on April 7. The programme includes a visit to the Central Electric Power Generating Station, Clarence Dock; and in the evening a paper will be read in the Large Chemistry Theatre of the University (entrance in Brownlow Street), by Dr. F. J. Brislee, on the "Corner Metals of Electrical Distribution—Copper, Aluminium and Lead." The president of the Institution, Viscount Leverhulme, will occupy the chair. Those intending to be present at the meeting should notify the hon. secretary, The Institution of Chemical Engineers, Abbey House, Westminster, London, S.W.1.

HEAVY STORMS along the Irish coast recently have considerably increased the quantity of kelp thrown up along the shores and this, it is believed, will cause some fall in price to chemical manufacturers engaged in the production of iodine. Consideration is being given to the establishment of a second factory on the west coast of Ireland, probably in County Donegal, to supplement the existing factory at Galway for the making of iodine. It has been revealed recently that kelp gatherers along this part of the coats have been disposing of considerable quantities of burnt kelp to English iodine manufacturers, and it is thought that a second government-aided factory closer to the scene of operations would provide them with a ready means of disposing of their kelp and probably at a better price for the gatherers.

THE BUSINESS of Thomas Piggott and Co., Ltd., has been controlled by the Horseley Bridge and Engineering Co., Ltd., for the past four years, but to meet the exigencies of modern business it has been decided to carry out a complete merger of the two concerns. Financial arrangements have been completed to give effect to this decision, and Thomas Piggott and Co., Ltd., is going into voluntary liquidation forthwith. The whole of the assets of Piggotts will be taken over by the Horseley Bridge and Engineering Co., and all liabilities will be dealt with by the liquidator in the ordinary course. The business of Piggotts will be carried on exactly as before. The same board of directors will be in control; there is to be no change in the management, and the works will continue to manufacture those products for which Piggotts have held a reputation for more than 100 years.

FINES AMOUNTING TO £510 were imposed at Bow Street on March 17 on charges under the Corrupt Practices Act, 1906, against three men—John E. Ferguson and Sidney Welsh, directors of Ferguson and Sons, Ltd., Merton Abbey, and Alfred James Buck, a chemist. They pleaded guilty. According to the prosecution, Buck was employed by Bakelite, Ltd., who made a moulding powder. Fergusons' were competitors. For many years Bakelite, Ltd., had a monopoly of a certain powder, but about 1928 Fergusons placed on the market a powder, which turned out to be the same. Buck having sold the secret to Fergusons. In an alleged statement, Buck said that he received money from Fergusons at the rate of £3 a week for six months, and since then at the rate of 30s. a week up to a few days ago. For giving bribes, Ferguson and Welsh were fined respectively £50 and £25 on each of the six charges against them, and Buck was fined £10 on each of the six charges against him of receiving bribes.

Stability of Greases

Investigations at the Bureau of Standards

THE United States Bureau of Standards is conducting an investigation of the effect of temperature on the bleeding of greases. It has been found that the change in the amount of bleeding, with increase in temperature, varies markedly for different types of greases. Thus, in some cases the amount of bleeding will increase as the temperatures increase, while in other cases the reverse is true. Believing that hardening of the grease due to loss of moisture on heating might account for the decrease in the extent of bleeding with increased temperature, some special experiments were undertaken to determine whether this was actually the case. In these special experiments the greases were heated to the temperature of test and allowed to remain at that temperature for a given period of time after which they were cooled. By comparison of the amount of bleeding before and after this heating process, it was concluded that loss of moisture may have some effect, but that more probably the grease sets with a different gel structure after heating, with resultant increase in hardness.

New Companies Registered

Fortescue & Spray, Ltd. Registered March 20. Nominal capital £500 in £1 shares. Manufacturers of and dealers in soap and washing materials, oils, greases, perfumery, oleaginous and saponaceous substances, etc. Directors: George Fortescue, 26 Brighton Street, Nottingham, H. D. M. Spray.

H. W. Osborne, Ltd. Registered March 20. Nominal capital £500 in £1 shares. Chemists, druggists, drysalters, oil and colourmen, etc. Directors: J. E. P. Lloyd, 42 York Road, Guildford, H. W. Osborne, and S. J. N. Lloyd.

Pinaud, Ltd. Registered March 20. Nominal capital £1,000 in £1 shares. Manufacturers of perfumes, scents, soaps, creams, disinfectants, etc. Directors: Lucien H. Klotz, Georges Klotz. Secretary, Wm. H. Worrall, Africa House, Kingsway, London, W.C.2.

S. E. S. Products, Ltd., 84 Corbetts Tey Road, Upminster, Essex. Registered March 20. Nominal capital £500. Manufacturers of and dealers in chemical products, preparers and mixers of chemicals of all kinds, etc.

Scalebuoys, Ltd. Registered March 16. Nominal capital £2,500 in 6d. shares. Water, electrical and general engineers, manufacturers of and dealers in a device or invention for the treatment of water, oil or gas known as the Scale Buoy, to adopt an agreement dated March 9, 1933, with R. H. S. Abbott, Mrs. E. Abbott and J. B. Close for the acquisition of the sole right in certain countries, including the United Kingdom, to an invention for the treatment of water, and for the acquisition of the business of the Scalebuoy Company of 9 Clements Lane, E.C., at present carried on by J. B. Close. Directors: J. B. Close, Mrs. C. M. B. Close, and G. P. Barker, 9 Clements Lane London, E.C.

The Thracian Mineral Products, Ltd.—Registered on March 17. Nominal capital of £250,000 in £1 shares. To acquire and turn to account any mines, mining rights and metalliferous land in the Near East or elsewhere; to take over all or any of the assets and liabilities of Thracian Galena Products, Ltd., and the Thracian Union Trust, Ltd., to prepare for market ore, metal and mineral substances; to carry on the business of manufacturers of lead pigments and paints, colourmen, chemical manufacturers and merchants, etc. A subscriber: Sir Neville A. Pearson, Bt., 1 The Grove, Highgate.

Books Received

Annual Reports on the Progress of Chemistry for 1932. Vol. XXIX. London: The Chemical Society. Pp. 344. 10s. 6d.

Department of Scientific and Industrial Research. Report for the year 1931-32. London: H.M. Stationery Office. Pp. 194. 3s.

British Plastics Year Book 1933. London: Plastics Press, Ltd. Pp. 460. 7s. 6d.

Catalysis and its Industrial Applications. By E. B. Maxted. London: J. & A. Churchill. Pp. 530. 36s.

Report of the Water Pollution Research Board for the Year ended June 30, 1932. Department of Scientific and Industrial Research. London: H.M. Stationery Office. Pp. 56. 1s.

The Investigation of Atmospheric Pollution, for the Year ended March 31, 1932. Department of Scientific and Industrial Research. London: H.M. Stationery Office. Pp. 102. 5s.

Report on Economic Conditions in the Republics of Guatemala Honduras and Nicaragua, November, 1932. Department of Overseas Trade. London: H.M. Stationery Office. Pp. 104. 3s.

Fans and Fan Systems

MODERN fan technique has become an important branch of engineering. The Sturtevant Engineering Co., Ltd., has now published a list of its monogram fans. There are two main types of monogram fans. The double inlet type is used principally for the supply of blast and ventilating; the single inlet type, which covers the whole range of usefulness, is suitable both for blowing and exhausting. Fans of this description have unrestricted inlets which are spigotted for connection to a line of piping. In the case of double inlet fans, the blast wheels, built up of steel plate on cast hubs, are carried, with the pulleys, between bearings which are usually of the ball or roller type, but may be of white metal in certain cases. With the single inlet fans, the blast wheels are overhung and the bearings are both on the side of the fan opposite to the inlet. The smaller sizes have ball bearings in a cast bracket between the wheel and pulley, and the larger sizes have either ball, roller, or white metal bearings with the pulleys between them. These fans are made in a range of sizes, running at speeds from 1,200 to 4,800 r.p.m., with an air pressure varying from 12 to 6 inches W.G. Among the other productions shown in this list are water gas plant fans, pulverised fuel fans, gas boosters, and high pressure fans. The latter follow the general construction of Monogram fans, and pressures up to 36 in. W.G. can be maintained. A chart is included in the publication to show the frictional resistance set up by the passage of air in smooth piping, for pipes of different diameters.

Company News

American Smelting and Refining Co.—The net earnings for the year 1932 were $3,708,010, compared with $10,232,591 in 1931. No dividends were paid.

Boots Pure Drug Co., Ltd.—The directors have declared the usual quarterly interim at 2½ per cent. per annum on the ordinary shares, payable March 31.

Reckitt & Sons, Ltd.—A final dividend of 6¼ per cent. and a bonus of 1¼ per cent., making 22½ per cent. for 1932, is announced on the ordinary shares, the same as for 1931. The annual meeting will be held on April 21.

British Oil and Cake Mills, Ltd.—A reduction in net profits from £666,162, to £514,282 in 1932 is reported. The dividend on the ordinary shares is 8 per cent., against 10 per cent., and the balance carried forward is £29,242, compared with £28,333. The annual meeting will be held at Winchester House, London, on March 29, at 12.30 p.m.

John Knight, Ltd.—The profits for the past year were £262,590, against £259,922 in the previous year. The ordinary dividend is increased to 45 per cent., against 30 per cent. in 1931 and 20 per cent. in 1930. The amount to be carried forward is £124,448. The annual meeting will be held at Abercorn Rooms, Great Eastern Hotel, Liverpool Street, London, on March 31, at 12 noon.

United Turkey Red Co.—The profit for 1932 after providing for repairs, depreciation and all charges and contingencies, was £58,503, to which is added the amount brought in £8,850, making £67,353. After payment of the preference dividends and transferring to first preference dividend reserve, £23,295 to meet amount appropriated in paying first preference dividend for 1931, the balance carried forward is £1,995. No dividend is recommended on the ordinary shares.

Tarmac, Ltd.—For the year 1932, the net profits, after providing general charges and tax, was £77,132, to which is added £29,126 brought forward, making £106,258. From this is deducted the dividend on preference shares for the year, and amount written off as depreciation, leaving £60,797. The directors recommend the directors' fees for the year £2,000, dividend on the ordinary shares of 5 per cent., subject to tax, transfer to general reserve £5,000, to staff fund £1,000, leaving to be carried forward £29,225. The annual meeting will be held at the Midland Hotel, Birmingham, on March 30, at 12.30 p.m.

Morgan Crucible Co.—The report for the year 1932 shows trading profit, after providing for depreciation £214,159, to which is added interest on investments and rents received, £23,294, balance brought forward £633, making £238,086. From this is deducted directors' fees, £3,187, interest on Employees Loan Obligations £2,528, dividends on preference and preferred ordinary shares, £61,233, leaving £95,329, which the directors propose be dealt with in capitalisation of 5 per cent. obligations to be retained for employment in business £53,950; final dividend of 6d. per share on the deferred ordinary shares, less tax, carrying forward £917. The annual meeting will be held at Church Road, Battersea, on March 30, at 11 a.m.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

Latvia.—The British Consul at Riga reports that the Latvian Roads Administration is calling for tenders, to be presented in Riga by April 6, 1933, for the supply of 200 metric tons of bitumen and 100 metric tons of bitumen emulsion. (Ref. B.X. 7528.)

Sweden.—A commission agent established at Langedrag, near Gothenburg, wishes to obtain the representation of United Kingdom manufacturers of industrial chemicals, pharmaceuticals and drugs; perfumes and cosmetics; chemists' and druggists' glassware, on a commission basis. Correspondence may be in English.

Forthcoming Events

Mar. 27.—Society of Chemical Industry (Yorkshire Section). Annual General Meeting. 7.15 p.m. University, Leeds.

Mar. 27.—Society of Chemical Industry (Yorkshire Section and Plastics Group). "The Industrial Uses of Rubber Latex." D. F. Twiss. 7.45 p.m. University, Leeds.

Mar. 27.—British Science Guild. A symposium on the Utilisation of Coal. 2.30 p.m. Royal Institution, Albemarle Street, London.

Mar. 28.—Institution of the Rubber Industry (Scottish Section). "The Chemist in Industry—Research, Realisation, and Reward." Dr. J. E. G. Harris. 25, Charlotte Square, Edinburgh.

Mar. 29.—Royal Society of Arts. "Colour Harmony." J. Littlejohns. 8 p.m. John Street, Adelphi, London.

Mar. 29.—The Chemical Society. Faraday Lecture. "The Relations between Stereochemistry and Physics." Professor Dr. Peter Debye. 5.30 p.m. 21 Albemarle Street, London.

Mar. 29.—British Association of Chemists (Liverpool Section). Annual Meeting. 7.30 p.m. Central Hotel, Widnes.

Mar. 30.—Chemical Society. Annual General Meeting. 4 p.m. Burlington House, London. Anniversary Dinner. 7.30 p.m. Grosvenor House, Park Lane, London.

Mar. 30.—Diesel Engine Users' Association. "Fuel Characteristics in Relation to Pump and Sprayer Action." L. J. Le Mesurier and R. Stansfield. Caxton Hall, Westminster, London.

Mar. 30.—Students' Chemical Society of the Manchester College of Technology. "Intermetallic Compounds." Dr. D. Stockdale. 5 p.m. Large Chemical Lecture Theatre, E.17.

Mar. 31.—Royal Institution. "The Nitrogen Hunger of the World." Sir Frederick Keeble. 9 p.m. 21 Albemarle Street, London.

Mar. 31.—West Cumberland Society of Chemists and Engineers. Annual Meeting and Smoking Concert. 7 p.m. Workington.

Mar. 31.—Society of Dyers and Colourists (Scottish Section). "Vat Dyes on Rayon." William N. Todd.

Mar. 31.—Manchester Literary and Philosophical Society. Annual Meeting. "The Art and Science of Leather Manufacture." Dr. D. Burton. 7 p.m. 36 George Street, Manchester.

Latex and Moulds

Para-nitrophenol as an Antiseptic Agent

The bacteriology of rubber is a subject which has not been studied in any great detail. It is true that the need to market clean rubber of good appearance has led to some investigations of moulds on sheet and crepe, and some twenty odd varieties of bacteria have been found as constituents of latex and feeding on crude rubber. According to the "Rubber Age," however, the subject has not been pursued exhaustively, and has scarcely been touched on in the case of vulcanised rubber goods. These will certainly leave hot presses or the sulphur chloride bath in a completely sterile condition, but they will soon be contaminated, while the well-known principle of storage in dark dampish places is ideal for mould development.

With the increasing use of latex in industrial processes, a new mould trouble has now arisen. It is discussed by Freitag in "Kunstoffe," 1932, 22, 233. Concentrated latex, as used for adhesive and coating work, has been found to develop mouldiness, particularly in the warm summer weather when maintained in storage. These moulds naturally cause a deterioration in properties and contaminate goods on which the latex is used. Their precise nature has yet to be established, but it is already suspected that the commonly occurring *Penicillium glaucum* is a frequent offender. Attempts to find antiseptic agents which will preserve the latex without detriment to its properties in use suggest that a small addition of para-nitrophenol in dilute aqueous solution is a satisfactory remedy. It will be recalled that the same reagent has been tried successfully in protectory crude rubber against moulds.

ADVERTISERS please note that the latest hour at which we can accept advertisements for insertion in these columns each week is 10 o'clock on Thursday morning.

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SECONDHAND Double Door Safe 3ft. oin., 3 ft. o in., 2 ft., two drawers inside, delivered £9. One Milner ditto, 5 ft. 6 in., 3 ft. 9 in., 2 ft. 6 in., delivered £30; bankrupt stock. Brew, Wormwood Street, London, E.C.2.

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